

# **CONFIRMATION SAMPLING REPORT**

## **Listou 21-35-18B Spill Cleanup Confirmation Soil Sampling Results CVID #19728**

(Release date: March 29, 2017)  
(Sampling Dates: October 24-26, 2017)

NWNE, Section 21, T35N R18E  
NENE, Section 21, T35N R18E

**Blaine County, Montana**

***Prepared for:***

**J. Burns Brown Operating Company  
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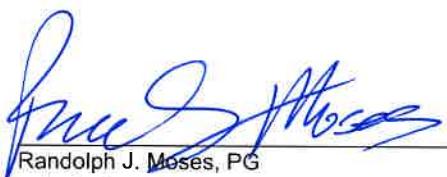
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**JBO.MT.0124.02**

**January 2018**

A handwritten signature in blue ink that reads "Randolph J. Moses".

Randolph J. Moses, P.G.  
Principal



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## 1 INTRODUCTION

J. Burns Brown Operating Company (JBBC) contracted Absaroka Energy and Environmental Solutions, LLC (AE<sub>2</sub>), to prepare a confirmation soil sampling plan and conduct confirmation soil sampling activities at the Listou #21-35-18B Production Facility (API# 25-005-23463). Previous site evaluation and reporting was conducted by Arcadis U.S., Inc and submitted to DEQ in May, 2017. According to the Arcadis report, the release occurred on March 29, 2017; cause unknown. The initial estimated release volume was reported as 238 barrels (bbl) crude oil (API Gravity 21.5) and 1,200 bbl water (Table 1). However, according to BBCO, all of the produced water was contained within the secondary containment berm of the facility. The released crude oil migrated approximately 215 feet northerly into a wetland depression adjacent to Chinook Reservoir/Canal impacting approximately 2.4 acres. A temporary check-dam (dike) was installed to prevent migration of the released fluids into adjacent wetlands and Chinook Canal. A portion of the affected lands are managed by the Bureau of Land Management – Havre Field Office (BLM-HFO). Confirmation soil sampling was conducted by Absaroka personal on October 24<sup>th</sup>, 25<sup>th</sup> and 26<sup>th</sup> of 2017, following the MTDEQ approve Confirmation Soil Sampling Plan submitted by AE<sub>2</sub>. Samples were submitted to ESC Lab Sciences for analyses and the results were obtained on November 30<sup>th</sup>, 2017.

The following report provides a general overview of the events of the incident, as well as site background, hydrogeology, and surface and groundwater receptors. The report also details the confirmation sampling event and soil analyses. Maps and other reference materials are also included.

Table 1: Spill Volume Estimates reported by BBCO and Arcadis.

<b>Volume Released to Environment</b>	<b>Volume Recovered</b>	<b>Initial Volume Unrecovered</b>
238 bbl crude oil (initial report)	100 bbl crude oil	138 bbl crude oil
1,200 bbl produced water (initial report) (0 bbl produced water escaped containment on location)		

### 1.1 Site Description and Location

The Listou #21-35-18B production facility release (Release) occurred from a single production well located approximately 21.5 miles northeast of Havre, Montana in Blaine County (**Appendix A – Project Map**). The release occurred in the NWNE and a small portion of the NENE of Section 21, Township 35 North, Range 18 East (Table 2). The released fluids flowed off location and downslope to the north approximately 438 feet (215 feet before entering the wetland depression).

Table 2: Location information regarding Listou 21-35-18B release.

<b>Feature</b>	<b>Land Survey</b>	<b>Coordinates (Lat/Lon; NAD 83)</b>
Release Origin	NWNE, Section 21, T35N R18E	48.781883, -109.380712
Furthest Extent of Release	NWNE, Section 21, T35N R18E	48.783435, -109.381031

The release location may be accessed by turning north off of US Highway 2, 1.73 miles east of Chinook, MT onto Old Highway Rd. E. Travel north approximately 1.73 miles to Elloam Road. Turn right onto Elloam Road and travel 11.28 miles to Norwegian Road. Turn west on Norwegian Road and travel approximately 3.28 miles. Norwegian Road turns north at this point. Continue north for approximately 1.43 miles. The field lease road is located at the point where Norwegian Road turns west again. The impacted area may be accessed on the north side of the production pad (Table 2; **Appendix B – Sampling Map**).

## 1.2 Contact Information

Pertinent contact information regarding the release and follow-up reporting are shown in Table 3.

Table 3: Contact Information.

<b>Contact</b>	<b>Person</b>	<b>Address</b>	<b>Phone No.</b>
Responsible Party	J. Burns Brown Operating Company	P.O. Box 420 Havre, MT 59501	406-265-7100
Regulatory Contact	John O. Brown	P.O. Box 420 Havre, MT 59501	406-265-7100
Environmental Contractor	Randolph Moses Absaroka Energy and Environmental Solutions, LLC	112 High Street Buffalo, WY 82834	307-620-9015
Landowner	Bureau of Land Management	3990 US Highway 2 West Havre, MT 59501	406-265-3634

## 1.3 Historic Land Use

The Site is located in a rural setting within the Northern Plains physiographic province. Historic land use for the area includes grazing of pastureland by livestock. In addition, the land is currently being used for oil/gas exploration and production operations. Prior to oil and gas operations, the area had few uses aside from agriculture.

## 1.4 Background – Spill and Initial Response

The following summary table (Table 4) outlines the details of the events (as they are currently understood by AE<sub>2</sub>) associated with the release at the Listou 21-35-18B. A map of the impacted area can be found in **Appendix B**. This summary is based on best available data as found in the previously submitted Arcadis

## CONFIRMATION SAMPLING REPORT



report and by JBBCO personnel. A more thorough treatment can be found in the previously submitted Remediation-Sampling-Restoration Plan (Arcadis).

Table 4: Incident chronology.

Date - Time	Event
March 29, 2017	Incident discovery and verbal reporting to various agencies. All equipment taken offline to stop release.
March 29-30, 2017	Dike installed within wetland to prevent further migration of oil.
March 30, 2017	Site Inspection by Mr. Gary Klotz, Montana BOGC.
March 31, 2017	Site Inspection by Ms. Kirsten Boyle, BLM.
March 31 – April 2, 2017	Attempts made to de-water wetland.
April 3, 2017	Sundry Notice filed with Montana BOGC.
April 4, 2017	BLM issues formal notice to cease response actions and file Remediation Plan before April 11, 2017
April 4 - 12, 2017	J. Burns Brown, et al contracts with Arcadis to conduct site characterization and prepare report and remediation and confirmation sampling plan.
April 10, 2017	Arcadis and BLM negotiate submittal of Plan overview by April 11, 2017
April 12, 2017	Arcadis (Ms. Kelsey Franko) conducts site assessment and documentation.
May, 2017	Arcadis submits Site characterization report including a proposed Remediation and Confirmation Sampling Plan
June 23, 2017	DEQ issues Notice of Violation and response letter (CVID # 19728) noting significant alterations to the proposed remediation and confirmation sampling plan
August 2, 2017	AE <sub>2</sub> is contracted by J. Burns Brown Operating Company
August 25, 2017	AE <sub>2</sub> submits Alternative Confirmation Sampling Plan to DEQ on behalf of J. Burns Brown Operating Company
September 6, 2017	DEQ issues response letter accepting the plan with some modifications. Requests submittal of final plan incorporating the modifications
October 24 – October 26, 2017	AE <sub>2</sub> conducts sampling of the location.

## 2 HYDROGEOLOGICAL CONDITIONS

### 2.1 Geology

The surface geology of the area is comprised of a complex stratigraphy of Quaternary fluvial, glaciofluvial, ice contact, glacial lacustrine, and aeolian deposits. These deposits overlie the Late Cretaceous Bearpaw Shale. The Bearpaw Shale is described as a dark-gray and brownish clay shale containing calcareous and ferruginous concretions throughout, with some thick bentonite beds.

### 2.2 Soil

Surface soil texture at the Site is primarily clayey-silty loam. Soil characteristics observed at the Site were compared to the Natural Resources Conservation Service's Web Soil Survey to determine soil type. Soils within the site consist of three primary soil series; the Kevin-Elloam complex, Phillips – Elloam complex, and



the Thoeny-Elloam complex. These soils occur in an area with mean annual precipitation of 10 to 14 inches, mean annual air temperature of 39 to 45 degrees, and a frost-free period of 105 to 125 days.

Kevin-like-Elloam-like complex soils occur on glacial till plains. These soils are clayey, loam, moderate to well drained, with a depth to groundwater that is typically greater than 80 inches. The Elloam Member soils are considered moderately to strongly saline (8.0 to 16.0 mmhos/cm) with a typical maximum sodium adsorption ratio of 25.0, whereas the Kevin Member is non-saline to slightly saline (0.0- 2.0 mmhos/cm). These soils have a typical depth to restrictive features more than 80 inches.

The Thoeny-Elloam complex soils occur on 0 to 4% slopes on glacial till plains. These soils are clayey-silty loam, well drained, with a depth to groundwater that is typically greater than 80 inches. They are considered slightly to strongly saline (4.0 to 16.0 mmhos/cm) with a typical maximum sodium adsorption ratio of 25.0. These soils are considered moderately corrosive to steel and have a typical depth to restrictive features (bedrock) of generally more than 80 inches.

Phillips – Elloam complex soils occur on glacial till plains. These soils are clayey, loam, moderate to well drained, with a depth to groundwater that is typically greater than 80 inches. The Elloam Member soils are considered moderately to strongly saline (8.0 to 16.0 mmhos/cm) with a typical maximum sodium adsorption ratio of 25.0, whereas the Phillips Member is slightly saline to moderately saline (4.0- 8.0 mmhos/cm). These soils have a typical depth to restrictive features more than 80 inches.

## 2.3 Hydrogeology

### 2.3.1 Groundwater

Shallow alluvial groundwater is likely present adjacent to surface water bodies such as Lodge Creek, Hay Coulee, and the North Chinook Irrigation Canal (depth to groundwater is assumed to be 0 to 10 feet). Depth to non-alluvial groundwater is unknown. Any non-alluvial shallow groundwater in the area would be hosted by the Bearpaw Shale, which rarely contains viable aquifers and is effectively an aquiclude. Shallow groundwater flow typically follows topography but may also be controlled by bedrock geology and geological structures. Although difficult to determine without installing groundwater monitoring wells, topography and structural dip at the Site suggests that shallow groundwater flow, if present, would trend parallel to (southeasterly) or toward the North Chinook Irrigation Canal (northeasterly).

A review of Montana's Ground Water Information Center data indicated no ground water supply wells within 1.0 miles of the release site (**Appendix C – Hydrologic Map**).



### 2.3.2 Surface Water

Surface water is present in the area in the form of streams, canals, and reservoirs. The closest surface water feature to the Site is the North Chinook Irrigation Canal. This water feature is approximately 1,500 feet to the north and northeast. The canal drains into the North Chinook Reservoir which is approximately 3,806 feet to the southeast of the Site. Fresh water emergent wetlands are located adjacent to the canal, including the wetlands area impacted by the Release. The impacted wetland drains north into the canal, which in turn, drains east into the North Chinook Reservoir.

The wetland area impacted by the release is in an emergent wetland terrain. These are shallow, glacial, depressions. The hydrology of these depressions are often extremely complex. The depressions often contain soils derived from parent materials that include fine grained, silty, and clayey soils, limestone, sandstone and shale. The vegetation within these potholes is influenced by the hydrology present. Most prairie potholes in Montana contain waters that are alkaline. Water accumulates rapidly during spring months and evaporated over the warm summer months. As the water evaporates, water chemistry changes and strongly influences vegetation in these wetlands.

Standing water (likely snow melt) was observed within the Release cleanup area during the confirmation soil sampling event. AE<sub>2</sub> collected a sample of this standing water and submitted it for analysis.

## 3 REMEDIATION

JBBCO conducted remediation activities at the Site over the late spring and summer of 2017. This work was partially guided by the Remediation Work Plan prepared by Arcadis, and partially guided by conditions outlined by the BLM-HFO and DEQ through verbal instructions and in the DEQ June 23<sup>rd</sup>, 2017 Notice of Violation letter (CVID# 19728). Remediation work included recovery of released fluids using vacuum truck and absorbent materials. Contaminated soil and vegetation was removed from the area and stockpiled. Soil excavation was guided using field screen techniques in order to both minimize waste generation and ensure impacted soils had been sufficiently removed before confirmation sampling is conducted. Field screening for volatile organic compounds (VOCs) was conducted by the BBCO's dirt work contractor using a photo-ionization detector (PID). The PID was calibrated prior to use utilizing 100 ppm isobutylene gas. Each sample screened was placed into a clean zip-lock bag, sealed with ample head space, and allowed to rest for 10 minutes. The headspace was then sampled by puncturing the sample bag with PID probe. The contaminated soil stockpile was hauled for disposal to the Hill County Unified Disposal Facility located approximately two miles west of Havre, Montana.

## 4 CONFIRMATION SAMPLING METHODS

### 4.1 General Sampling Methods

Soil sampling followed industry accepted sampling procedures and a modified Montana DEQ confirmation sampling protocol. Soil aliquot samples were collected with a soil bucket auger or stainless-steel trowel. Aliquot samples collected from 0-3 inches in the soil profile. Deeper samples were planned if hydrocarbons were readily detected in the 0-3-inch sample. However, deeper samples were not needed. The only readily observed hydrocarbons remaining in the cleanup area were present as minor hydrocarbon staining along desiccation cracks. These can be seen in **Appendix E**. Soil was transferred directly into soil sample containers provided by the lab or into a stainless-steel bowl for homogenization prior to being transferred to sample containers. Each labeled and documented sample was transferred immediately to a cooler and preserved with ice for transport to the lab. Sampling personnel donned nitrile gloves during the sampling activities; donning new gloves between each sample location in order to prevent cross-contamination.

Each soil sample grid was analyzed as follows:

- EPH (Ma-Method) screen
- VPH (Ma-Method)

For all of the soil samples that screen above 200 mg/kg EPH, the following additional analyses were conducted:

- EPH (Ma-Method) fractionation
- PAH
- TCLP Metals + nickel
- SAR
- pH
- EC
- Sulfate

Splits of the aliquot VPH samples were collected and submitted to the under controlled conditions. The lab was instructed to retain these samples should the DEQ require additional analyses.

### 4.2 Grid Areas

The sampling plan, as follows, was a tiered confirmation soil sampling protocol. The impacted area was divided into areas based on relative degree of impact. Sample grid areas are designated Type 1 (High Impact), Type 2 (Moderate Impact) and Type 3 (Low Impact). Grid size (area) is different for each type with Type 3 grid size undesignated. Details of each grid type and sampling protocol are outlined, below.



#### 4.2.1 Type 1 Areas (High Impact):

- One (1) composite sample per 2,500 ft<sup>2</sup> of excavation floor area was collected for EPH Screen and EPH Fractionation analyses. This composite sample consisted of four (4) sub-composites, each comprised of 5-point aliquots from each 625 ft<sup>2</sup> grid subdivision (see attached Sampling Grid Map)
- One (1) composite soil sample composed of four aliquot subsamples (each 625 ft<sup>2</sup> subarea) was collected from each designated 2,500 ft<sup>2</sup> of excavation floor area for VPH analysis. Splits of the VPH samples were composited in the field; the remaining split each aliquot sample was submitted to the lab under controlled conditions for potential future, targeted, analyses.
- A total of fourteen (14) Type 1 Samples were collected.

#### 4.2.2 Type 2 Areas (Moderate Impact):

- One (1) composite sample per 5,625 ft<sup>2</sup> of excavation floor area was collected for EPH Screen and EPH Fractionation analyses. This composite sample consisted of nine (9) sub-composites, each comprised of 5-point aliquots from each 625 ft<sup>2</sup> grid subdivision (see attached Sampling Grid Map)
- One (1) composite soil sample composed of nine aliquot subsamples (each 625 ft<sup>2</sup> sub-grid area) was collected from each designated 5,625 ft<sup>2</sup> of excavation floor area for VPH analysis. Splits of the VPH samples were composited in the field; the remaining split each aliquot sample was submitted to the lab under controlled conditions for potential future, targeted, analyses.
- A total of four (4) Type 2 samples were collected. This includes N21O23 which was a partial polygon.

#### 4.2.3 Type 3 Areas (Low Impact):

- No Type 3 areas were designated or sampled.

#### 4.2.4 Water Samples

A single water sample was collected from standing water present within the cleanup area. No water was located north of the temporary containment dike and the sample location is depicted on the Sampling Map (**Appendix B**).

#### 4.2.5 Oil Sample

One sample of free-product (production fluids) was collected and held by AE<sub>2</sub>. However, no request has been made by DEQ for the sample to be analyzed for desired parameters.

### 4.3 Perimeter Sampling

Perimeter confirmation samples were collected to ensure that the aerial extent of the contamination has been defined and removed. One 5-point composite sample was collected for every 150 linear feet of perimeter along the excavation edge. Aliquots samples were collected from undisturbed soil within one foot



of the excavation boundary. Splits of the VPH samples were composited in the field; the remaining split each aliquot sample was submitted to the lab under controlled conditions for potential future, targeted, analyses.

A total of 11 perimeter samples were collected.

#### 4.4 Background Reference Samples

Two background soil samples were collected for baseline comparative and reference purposes. One sample was collected from an adjacent, unaffected upland area, and another sample was collected from a nearby, unaffected wetland area (identified on the Sampling Map – **Appendix B**). Background samples were analysed for the following constituents:

- EPH Screen and EPH (Ma-Method) fractionation
- VPH
- pH
- EC
- SAR
- Sulfate
- TCLP Metals + nickel

Two background soil samples were collected: one from an upland area, one from a wetland area.

#### 4.5 Field Screening

Field screening was conducted during the sampling effort to further characterize potential residual impacts to the soils at the Site. A calibrated RAE MiniRAE 3000 Photoionization Detector (PID) was used to field screen each soil subsample or aliquot location for all grid types. In addition, the PID readings were collected for background samples. The sample was collected into a Ziploc bag and allowed to rest for one minute. After one minute, the PID sampling probe was used to puncture the head space of the Ziploc bag and the PID reading was collected. PID readings provide additional evidence regarding contaminant levels in remediated areas and may help to guide any additional clean-up, if necessary, at the Site.

#### 4.6 Decontamination

All sampling equipment were decontaminated between each sample by first removing any remaining soil, then washing with an Alconox solution, then rinsing with distilled water. Equipment was allowed to air dry prior to subsequent sampling. Sampling personnel donned nitrile gloves during the sampling activities; donning new gloves between each sample location.



## 4.7 Chain of Custody

Chain of Custody (COC) protocol followed generally accepted methods. Sample containers were sealed and placed on ice in coolers for shipment. Prior to shipping, the COC was signed and dated by the sampler. The COC was sealed in a Ziploc bag and taped to the inside of the cooler lid. The sample coolers were packed with ice to preserve the samples and cooler is sealed and taped shut for shipment. Lab personnel, upon receipt of the coolers, removed the tape, broke the cooler seal, retrieved the COC, and then filled in the appropriate lab receipt information and signed the document. Documentation of the completed COC was sent to AE<sub>2</sub> via email and is attached to the laboratory analysis report.

## 4.8 Documentation

Each sample location was fully documented. At minimum, documentation includes the following items.

- Collector Name
- Sample name
- Sample date/time
- Sample type (discrete, composite)
- PID reading
- Coordinates
- Photographic
- Visual/Olfactory observations
- Soil description
- Other notes

To assist with the documentation effort, a GPS enabled digital device, sample log forms (**Appendix D**), and a sample log table were utilized to track and record data. Sample locations were photo-documented and the center of each Type 1 and Type 2 grid area was marked with a labelled stake or pin-flag. The end points of perimeter samples will also be marked with a labelled stake or pin-flag.

## 4.9 Sample Naming Strategy

Each sample was labeled based on the grid area (pre-determined) from which it is collected. The alpha-numeric base grid (625 ft<sup>2</sup>) depicted on the attached sampling map, was used to determine the name of the sampled grid. For example, if the Type 1 sample grid encompassed the base grid depicted below, then the Type 1 sample grid would be named B5C6.

D7	D6	D5	D4	D3
C7	C6	C5	C4	C3
B7	B6	B5	B4	B3
A7	A6	A5	A4	A3

## 5 QUALITY ASSURANCE / QUALITY CONTROL

To insure consistency with sampling and documentation, a three-man sampling team was utilized during soil confirmation sampling. One team member was assigned to collecting and processing soil samples. The second team member was assigned to documentation and homogenization duties, and the third was assigned decontamination duties.

### 5.1 Data

Data collected for each sample was documented by several methods. Each sample location centroid was documented using a digital device equipped with a GPS receiver. Aliquot locations were not documented due to limitations in GPS accuracy. In addition, each sample was documented on a soil sample log form. Finally, a sampling log table was completed as samples were collected documenting that all of the required samples and attribute date were collected and recorded. Each sample location was also photo-documented and a photo-log was used to document the photographs.

Sample log forms, log tables, and GPS waypoint data was cross-checked daily to ensure accurate data.

### 5.2 Analytical Controls

At least one split sample was collected per day with a total of three split samples. Split samples were analyzed for the same parameters as Type 1 and 2 area samples. Results from the analysis of the split samples were compared to the original sample for quality control purposes. In addition, split samples were collected by MTDEQ and analyzed as well serving as an additional quality control.

### 5.3 Data Validation

Data validation was evaluated by DEQ. In a recent letter from DEQ (January 2, 2018), DEQ reported that the results of analyses on two split soils samples indicated that contaminants and contaminant levels were consistent with larger soil sampling program (reported here).



## 6 PLAN DEVIATIONS

Additional sampling containers were available in the event that additional sampling was warranted. Conditions that warranted additional sampling included discovery of potentially contaminated soil areas not addressed during cleanup activities, discovery of contamination in remediated areas at depths greater than anticipated, or discovery of significant differences in soil type/textural in areas. In addition, additional sampling containers for water samples were available for collecting surface water, if present.

Several plan deviations to the Plan were necessary. They are described as follows:

- A smaller than expected area was present at the location. As such, a smaller perimeter was present to be sampled, and less area was available. To compensate for this, most Type 2 samples were converted to Type 1 samples. This had the effect of maintaining total sample coverage while increasing sample resolution.
- A minor deviation occurred between sample polygons M24O26 and I29K25, where standing water limited the ability to collect a soil sample. This deviation is mitigated by the presence of the water sample collected in this area (WS-M24).

## 7 RESULTS

A summary of the results is attached as **Appendix F** and the lab report is attached as **Appendix G**. Based on discussions with DEQ, the Tier 1 Risk-Based Screening Levels (RBSLs) for subsurface soil (soil less than two feet) where groundwater is less than 10 feet deep (**Appendix F**) were chosen as the cleanup standard for the Site (**Appendices H**).

**Appendix B** depicts the confirmation sampling locations, including the location of the sample grids, grid areas exceeding RBSL screening levels, and the exceedance values. In general, confirmation sampling indicates that remediation activities have successfully removed all significant hydrocarbon impacts from the Release area. **Appendix F** (Sample results) lists the results of the confirmation sample analyses and the corresponding RBSL cleanup levels.

The soil confirmation sampling analyses indicate the following:

- 35 total samples were collected:
  - Type I: 14
  - Type II: 4
  - Perimeter: 11

- 1 water
- 2 background
- 3 duplicate
- A total of five (5) samples of the 35 total unique samples collected exceeded the EPH screening level (200 mg/kg), requiring fractionation analyses;
  - Samples P5-P6, I29K25, I20J21, I18J19, and G20H21 exceeded the EPH screening level;
  - Note the location of the above samples; with the exception of P5-P6, all are clustered in the center of the release area, indicating geospatial control;
- Type 1 grid sample G20H21 had a EPH screen of 2,590 mg/kg, and a C11-C22 aromatics content of 1,520 mg/kg, exceeding the RBSL cleanup level for C11-C22 Aromatics (RBSL cut off: 370 mg/kg);
  - The split for this sample (G20H21-COMP) does not share the elevated results, and is, in fact, below the EPH screening level (200 mg/kg). This implies that a very small sample of soil with higher readings was located in the primary sample, resulting in elevated readings;
  - G20H21's PID results were not elevated (the highest value, located in aliquot grid G20, was 5.0 mg/kg).
- Perimeter sample P5-P6 exhibited C11-C22 aromatics content of 431 mg/kg;
  - No immediate impacts were visible in by eye in sample P5-P6, and the PID readings of 1.4 mg/kg were not significant. It is thought that sample P5-P6 may be contaminated with biological material from the nearby wetland, resulting in erroneous results;

Minor visible impacts remaining are related to hydrocarbon staining along desiccation cracks (depicted in the Photographic log – **Appendix E**). Hydrocarbon staining along these mudcracks is limited in depth and lateral extent; often less than a few inches. Exceedances reported above are likely related to impacts that remain along these mudcracks.

In a recent letter from DEQ (January 2, 2018), DEQ reported that the results of analyses on two split soils samples indicated that contaminants and contaminant levels were consistent with larger soil sampling program (reported here). These results are contained in **Appendix H**.

## 8 CONCLUSIONS AND RECOMMENDATIONS

Thirty-five (35) confirmation samples were collected, including fourteen (14) Type 1 samples, four (4) Type 2 samples and eleven (11) perimeter samples, in addition, one (1) water sample, two (2) background samples, and three (3) duplicate samples. Of the 35 samples, five were above the EPH screening level of 200 mg/kg. Of the five, two exceeded the RBSL Table 2 cleanup limits for C11-C22 Aromatics (370 mg/kg).

- Sample P5-P6 had a C11-C22 aromatic content of 431 mg/kg.
- Sample G20H21 had an C11-C22 aromatic content of 1,520 mg/kg.

The results of the confirmation soil sample analyses indicate the cleanup efforts at the Site have been broadly successful in remediating the impacts of the Release. The pair of sample locations noted above contain contaminants at levels above the RBSL screening level. However, the area, volume, and degree of the remaining impacts is relatively small. Remaining visual impacts are tightly associated with small scale desiccation cracks where crude oil was able to migrate vertically beyond the depth of the current excavation. Visual staining extended only 1-3 inches laterally from the desiccation cracks and in most cases extended only an additional 6 to 12 inches in depth below the existing excavation.

Discussions between MTDEQ and AE<sub>2</sub> in regard to the results of the confirmation sample analyses resulted in the conclusion that the remaining contamination is minor. Perennial surface waters are not impacted nor does there appear to be shallow ground water at immediate risk from the remaining contaminants. In a recent letter from DEQ (January 2, 2018), DEQ confirmed that surface waters had not been impacted according to an analysis of a water sample taken downstream of the Release. Furthermore, the entire clean up area is slated to backfilling with up to two feet of clean soil. Once the remaining impacts have been buried by backfill and the area has been reclaimed, there will be little chance for the remaining contaminants to impact surface water.

Therefore, AE<sub>2</sub> has concluded that the remaining impacts likely do not pose a risk to human health or the environment.

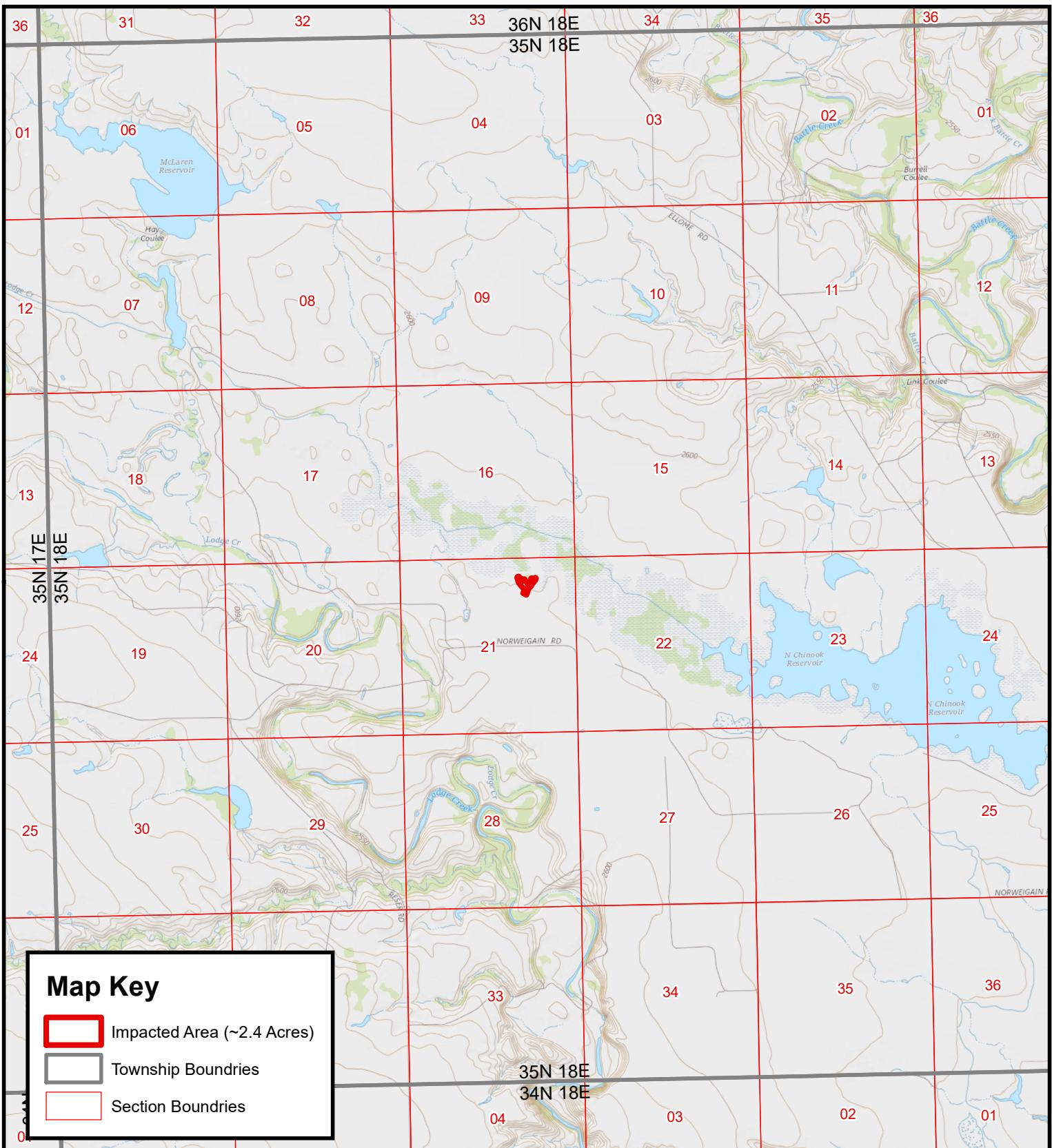


## APPENDICES



## Appendix A – Project Location Map

---



Date: 1/26/2018

JBO.MT.0124.01

### John Burns Brown Oil Company Listou 21-35-18B Project Area Map

Blaine County, Montana

0 0.25 0.5 1 1.5 2 Miles

Coord. Sys.: WGS 1984 UTM Zone 12N

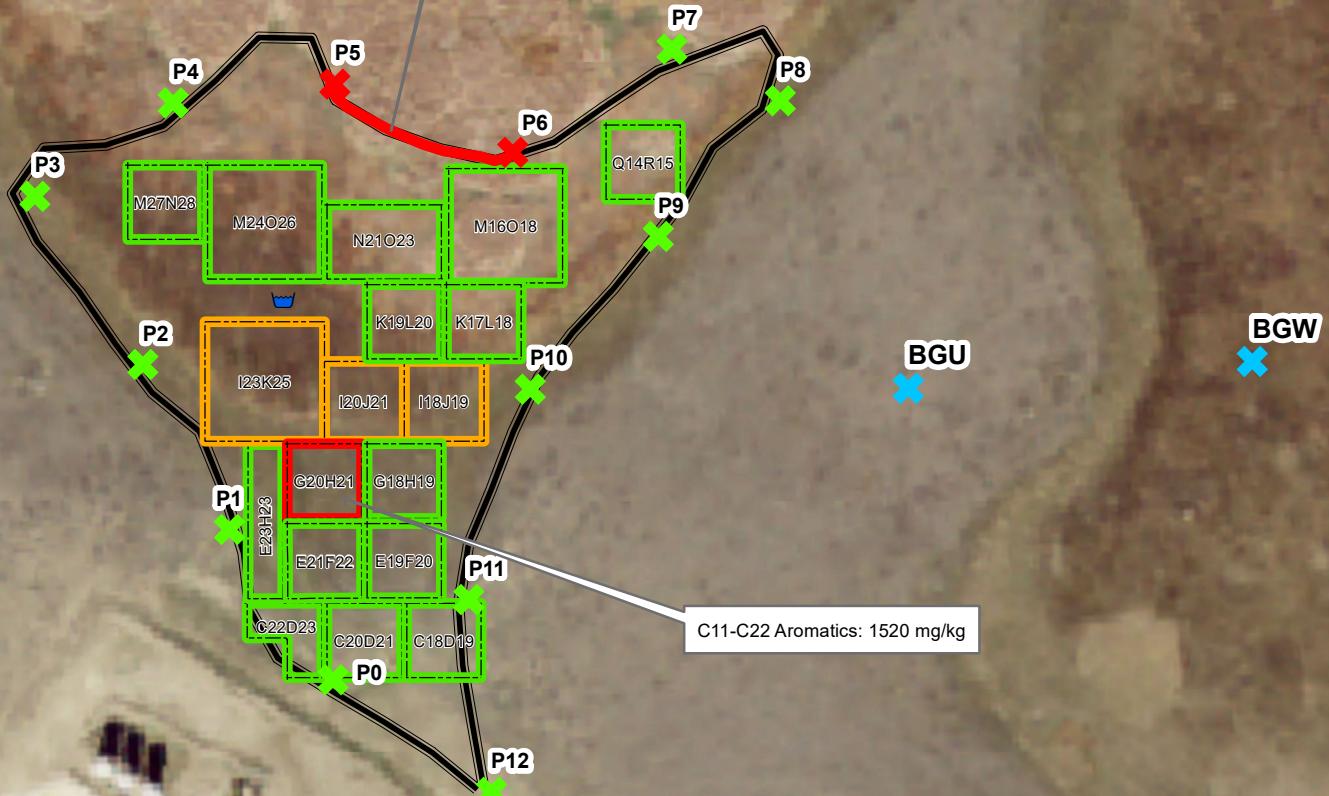
John Burns Brown  
Oil Company

Scale: 1:48,000



## Appendix B – Sampling Map

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### Map Key

- ✖ Background Sample Location
- ✖ Perimeter - Below Threshold
- ✖ Perimeter - Exceeds Threshold
- Soil Sample - Below Threshold
- Over EPH Screen Value, no RBSL exceedance
- Soil Sample - Exceeds Threshold
- ⠈⠈ Water Sample Location (WS-M24)
- Mapped Perimeter of Spill



Date: 1/26/2018

JBO.MT.0124.01

### John Burns Brown Oil Company Listou 21-35-18B Confirmation Sampling Results

Blaine County, Montana

0 50 100 200 300 Feet

Coord. Sys.: NAD 1983 UTM Zone 12N

John Burns Brown  
Oil Company

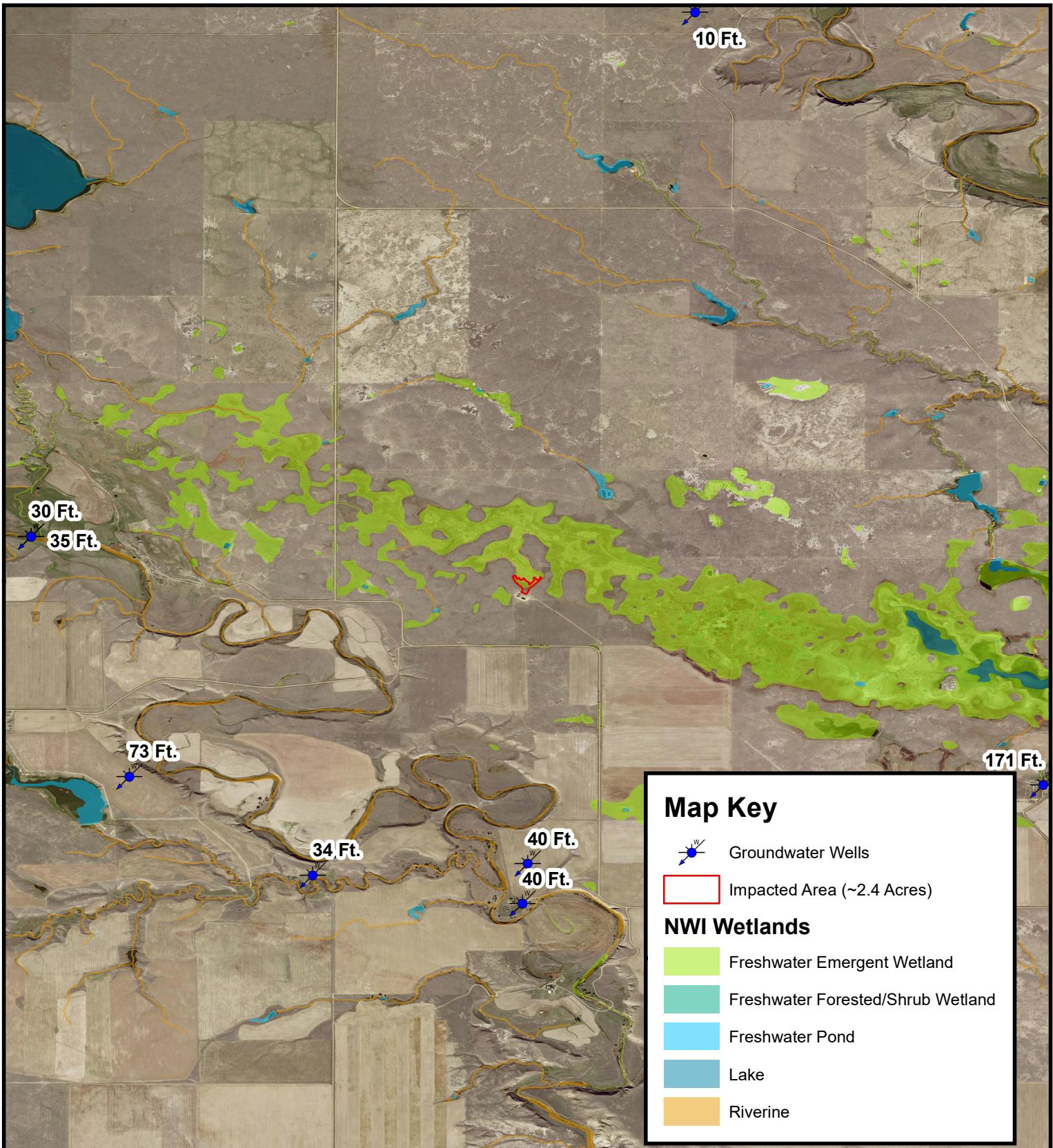
Scale: 1:1,445





## Appendix C – Hydrologic Map

---



112 High Street  
Buffalo, Wyoming 82834  
855.684.5891  
[www.absarokasolutions.com](http://www.absarokasolutions.com)

Date: 1/26/2018

JBO.MT.0124.01

## John Burns Brown Oil Company Listou 21-35-18B Hydrologic Features Map

Blaine County, Montana

0 0.25 0.5 1 1.5 2 Miles

Coord. Sys.: GCS North American 1983

John Burns Brown  
Oil Company

Scale: 1:48,000

## Appendix D – Sample Log Forms

---



Sample ID: BGW Date: 10/24/2017

Time: 1345 Sampler: CW NK HT

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab  Composite  Sample Depth: 3in

Potential for Ground water: Low  / Med  / High  Est. Depth to Groundwater: \_\_\_\_\_

Surface water Impact: Yes  / No  Sensitive Receptors: wetlands

Visual Staining: Yes  / No  Odor: Yes  / No

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

Sample Description:

Background  
wetland

PID Readings		
0.04		

0.04

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 49° 78' 25.52" -109° 37' 16.4"



Sample ID: BGUV Date: 10/24/2017

Time: 1330 Sampler: HT MK CW

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab X / Composite \_\_\_\_\_ Sample Depth: 3 inches

Potential for Ground water: Low X / Med \_\_\_\_\_ / High \_\_\_\_\_ Est. Depth to Groundwater: —

Surface water Impact: Yes \_\_\_\_\_ / No X Sensitive Receptors: Wetlands

Visual Staining: Yes \_\_\_\_\_ / No X Odor: Yes \_\_\_\_\_ / No X

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

Sample Description:

Upland background

PID Readings ppm		
0.1		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 49.792519, -109.378603



Sample ID: P0-P1 Date: 10/24/2017

Time: 1439 Sampler: CW ME HHT

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab    / Composite X Sample Depth: 3in

Potential for Ground water: Low X / Med X / High    Est. Depth to Groundwater:   

Surface water Impact: Yes X / No X Sensitive Receptors: wetland

Visual Staining: Yes    / No    Odor: Yes    / No X

PID Reading: 0.3 Conductivity:   

Sample Description:

PID Readings		
0.3		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.782039, -109.380176



Sample ID: P1-P2 Date: 10/24/2017

Time: 1445 Sampler: HHT CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab    / Composite X Sample Depth: 3in

Potential for Ground water: Low    / Med X / High    Est. Depth to Groundwater:   

Surface water Impact: Yes X / No    Sensitive Receptors:   

Visual Staining: Yes    / No X Odor: Yes    / No X

PID Reading: 0.1 Conductivity:   

**Sample Description:**

PID Readings		
0.1		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.781301, -109.380437



Sample ID: P2-P3 Date: 10/24/2017

Time: 1520 Sampler: HH CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3 in

Potential for Ground water: Low / Med X / High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors: Wetland

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 0-2 Conductivity:

Sample Description:

Perimeter

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.782584, -109.380652

cooler #2



Sample ID: P3-P4 Date: 10/24/2017

Time: 1525 Sampler: HFT CW MC

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3in

Potential for Ground water: Low / Med X / High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors: Wetland

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 0.6 Conductivity:

Sample Description:

Perimeter  
Sample

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.782881, -109.380925



Sample ID: P4-P5 Date: 10/24/2017

Time: 1535 Sampler: HH CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3in

Potential for Ground water: Low / Med X High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors: Wetland

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 0.9 Conductivity:

Sample Description:

PID Readings		
0.9		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.7803036, -109.380560



Sample ID: PS-P6 Date: 10/24/2017

Time: 1550 Sampler: HH MK CW

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3in

Potential for Ground water: Low / Med X / High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors: Wetland

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 1.4 Conductivity:

Sample Description:

PID Readings		
1.4		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.783063, -104.380138



Sample ID: P6 - P7 Date: 10/24/2017

Time: 1600 Sampler: HFT CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC 3in

Sample Type: Grab / Composite X Sample Depth:

Potential for Ground water: Low / Med X High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors:

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 0.8 Conductivity:

Sample Description:

PID Readings		
0.8		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48,782939, -109,379678



Sample ID: P7-P8 Date: 10/24/2017

Time: 1605 Sampler: HH CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3in

Potential for Ground water: Low / Med X / High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors:

Visual Staining: Yes / No Odor: Yes / No

PID Reading: 0.9 Conductivity:

Sample Description:

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.78311, -109.379259



Sample ID: P8-P9 Date: 10/24/17

Time: 16:06 Sampler: MK HH CW

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3in

Potential for Ground water: Low / Med X / High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors:

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 0.4 Conductivity:

Sample Description:

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.783018, -109.378980



Sample ID: PQ-P10 Date: 10/24/17

Time: 1020 1625 Sampler: fth CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3in

Potential for Ground water: Low / Med X / High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors:

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 0.5 Conductivity:

Sample Description:

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48,782789, -109,379304



Sample ID: P10-P11 Date: 10/24/17

Time: 1635 Sampler: HFT CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3in

Potential for Ground water: Low / Med X / High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors:

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 1.3 Conductivity:

Sample Description:

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.782531, -109.379646



Sample ID: P11 - P12 Date: 10/24/2017

Time: 1645 Sampler: MK/HH/CW

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3'

Potential for Ground water: Low / Med / High X Est. Depth to Groundwater: 10 Ft

Surface water Impact: Yes X / No Sensitive Receptors: wetland

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 0.9 Conductivity:

**Sample Description:**

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.782172, -109.37817



Sample ID: WS-M24 Date: 10/23

Time: 1310 Sampler: MK HH CW

Contaminant: DRO, GRO, ESP, PH, SAR, EC Hydrocarbon

Sample Type: Grab  / Composite Sample Depth: SURFACE

Potential for Ground water: Low \_\_\_ / Med \_\_\_ / High \_\_\_ Est. Depth to Groundwater: ?

Surface water Impact: Yes  / No \_\_\_ Sensitive Receptors: wetland

Visual Staining: Yes  / No \_\_\_ Odor: Yes \_\_\_ / No \_\_\_

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

Sample Description:

minor grease on  
soil near water edge

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.7827, -109.3801

Water Sample  
WS-M24 10/23/17 1310



Sample ID: I23/K25 Date: 10/20/17

Time: 11:45 Sampler: \_\_\_\_\_

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite  Sample Depth: \_\_\_\_\_

Potential for Ground water: Low / Med / High  Est. Depth to Groundwater: \_\_\_\_\_

Surface water Impact: Yes / No  Sensitive Receptors: \_\_\_\_\_

Visual Staining: Yes / No  Odor: Yes / No

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

Sample Description:

J24: Staining  
K25: ↑

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.1826 - 118.3800

122 J K  
123 J K  
124 J K



Sample ID: M24026 Date: 10/26/2017

Time: 1230 Sampler: HH W MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite  Sample Depth: 3in

Potential for Ground water: Low / Med X High / Est. Depth to Groundwater:

Surface water Impact: Yes X / No  Sensitive Receptors:

Visual Staining: Yes  / No X Odor: Yes  / No X

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

**Sample Description:**

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48, 7828 - 109, 38



Sample ID: M27N28 Date: 10/26/17

Time: 1355 Sampler: HT CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite  Sample Depth: 3in

Potential for Ground water: Low / Med  High / Est. Depth to Groundwater:

Surface water Impact: Yes  / No  Sensitive Receptors: wetland

Visual Staining: Yes / No  Odor: Yes / No

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

Sample Description:

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 46.7829 -109.381



SPLIT SAMPLE

N21023

comp2

Sample ID: N21023 Date: 10/26/2017

Time: 1320 Sampler: WHT MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab  / Composite  Sample Depth: 3in

Potential for Ground water: Low  / Med  / High  Est. Depth to Groundwater: \_\_\_\_\_

Surface water Impact: Yes  / No  Sensitive Receptors: \_\_\_\_\_

Visual Staining: Yes  / No  Odor: Yes  / No

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

Sample Description:

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.7828, -109.38



Q14 RK

Sample ID: 615 Date: 10/26/17

Time: 1030 Sampler: CW MK HH

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab  / Composite  Sample Depth: 3in

Potential for Ground water: Low  / Med  / High  Est. Depth to Groundwater: \_\_\_\_\_

Surface water Impact: Yes  / No  Sensitive Receptors: \_\_\_\_\_

Visual Staining: Yes  / No  Odor: Yes  / No

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

**Sample Description:**

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48, 7829 - 104, 379



Sample ID: M16018 Date: 10/26/17  
Time: 945 Sampler: W HH MK  
Contaminant: DRO, GRO, ESP, PH, SAR, EC  
Sample Type: Grab / Composite  Sample Depth: 3in  
Potential for Ground water: Low / Med X / High  Est. Depth to Groundwater:   
Surface water Impact: Yes X / No  Sensitive Receptors:   
Visual Staining: Yes X / No  Odor: Yes X / No   
PID Reading:  Conductivity:

Sample Description:

016 visual impact

NIT

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 46,7828 - 109,38



Sample ID: C20D21 Date: 10/25/17

Time: \_\_\_\_\_ Sampler: HH CW MIC

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3in

Potential for Ground water: Low / Med X / High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors: Wetland

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 0.0 Conductivity:

Sample Description:

C20  
C21  
D20  
D21

) grab

PID Readings		
C20	0.0	
0.0	0.0	
D20	D21	
0.0	0.0	

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48,7821 109,38



E23 H23

Sample ID: \_\_\_\_\_ Date: \_\_\_\_\_

Time: ~~1020 830~~ Sampler: CW KTH MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab  / Composite  Sample Depth: 3in

Potential for Ground water: Low  / Med  / High  Est. Depth to Groundwater: \_\_\_\_\_

Surface water Impact: Yes  / No  Sensitive Receptors: \_\_\_\_\_

Visual Staining: Yes  / No  Odor: Yes  / No

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

Sample Description:

F23: Visual  
G23: ⇒ Staining & odor

PID Readings			

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.7823 -109.38

Needs  
COC



Sample ID: C22 D23

Date: 10/25/17

Time: 10/5

Sampler: HH CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X

Sample Depth: 3in

Potential for Ground water: Low / Med X High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors:

Visual Staining: Yes / No X Odor: Yes / No X

PID Reading: 0.0 Conductivity:

## Sample Description:

Cutting out  
C23

PID Readings	
0.0	0.0
D22	D23
0.0	0.0

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.7821 -109.38



Sample ID: C18D19 Date: 10/20/17

Time: 930 Sampler: HH CW MC

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab  / Composite  Sample Depth: \_\_\_\_\_

Potential for Ground water: Low  / Med  / High  Est. Depth to Groundwater: \_\_\_\_\_

Surface water Impact: Yes  / No  Sensitive Receptors: \_\_\_\_\_

Visual Staining: Yes  / No  Odor: Yes  / No

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

Sample Description:

D18 slight  
stain/odor

D19 ↑

PID Readings		

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.7821 -109.38



Sample ID: G18H19 Date: 10/25/2017  
Time: 1145 155 Sampler: HT CW MK  
Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab  / Composite  Sample Depth: 3in

Potential for Ground water: Low  / Med  / High  Est. Depth to Groundwater: \_\_\_\_\_

Surface water Impact: Yes  / No  Sensitive Receptors: Wetland

Visual Staining: Yes  / No  Odor: Yes  / No

PID Reading: 4.5 Conductivity: \_\_\_\_\_

Sample Description:

H18: visual  
stain  
hydrocarbon  
odor

G19 -  same

  
H19 Sam

PID Readings		

H19: 1.8  
H18: 5.6  
G19: 26.3

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 46.7824 - 109,38



split sample  
collected  
G120H21COMP1

Sample ID: G120H21 Date: 10/25/2017

Time: 1245 Sampler: HH MRW

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite X Sample Depth: 3cm

Potential for Ground water: Low / Med X High Est. Depth to Groundwater:

Surface water Impact: Yes X / No Sensitive Receptors: wetland

Visual Staining: Yes X / No Odor: Yes X / No

PID Reading: 39.4 Conductivity:

Sample Description:

PID Readings =		

G120:5  
G121:2.7  
H21:3.1

G21 staining  
E20  
H21 staining/odor

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.7821 -109.38



Sample ID: J18 J19 Date: 10/25/2017  
Time: 1220 Sampler: HC1 CW MR  
Contaminant: DRO, GRO, ESP, PH, SAR, EC  
Sample Type: Grab / Composite X Sample Depth: \_\_\_\_\_  
Potential for Ground water: Low / Med X / High  Est. Depth to Groundwater: \_\_\_\_\_  
Surface water Impact: Yes X / No  Sensitive Receptors: \_\_\_\_\_  
Visual Staining: Yes X / No  Odor: Yes X / No   
PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

Sample Description:

PID Readings		

J19:1.3  
J18 13  
J18.1.4  
J19-5.0

J19 → visual staining

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48° 7' 25" -109, 38'



Sample ID: E19F20 Date: 10/25/17  
Time: 930 Sampler: HHT CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite  Sample Depth: 3cm

Potential for Ground water: Low / Med  High / Est. Depth to Groundwater: \_\_\_\_\_

Surface water Impact: Yes  No  Sensitive Receptors: \_\_\_\_\_

Visual Staining: Yes  No  Odor: Yes / No

PID Reading: 0.0 Conductivity: \_\_\_\_\_

Sample Description:

PID Readings			
E19	6.0	E20	0.0
F19	0.0	F20	0.0

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48° 7' 8.22" N - 119, 38' W



Sample ID: E21 F22 Date: 10/25/17  
Time: 1030 Sampler: MK (W NH)

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab  / Composite  Sample Depth: 3in

Potential for Ground water: Low  Med  High  Est. Depth to Groundwater: \_\_\_\_\_

Surface water Impact: Yes  / No  Sensitive Receptors: \_\_\_\_\_

Visual Staining: Yes  / No  Odor: Yes  / No

PID Reading: 520 Conductivity: \_\_\_\_\_

Sample Description: 3.2

F22: hydrocarbon staining  
on central  
soil.

PID Readings	
E21	E22
F22	F22
520	620

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48,7823 - 109,38



Sample ID: I20 J21 Date: 10/25/2017

Time 12:35 Sampler: HH CW MK

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab / Composite  Sample Depth: 3cm

Potential for Ground water: Low / Med  High / Est. Depth to Groundwater: \_\_\_\_\_

Surface water Impact: Yes  / No  Sensitive Receptors: \_\_\_\_\_

Visual Staining: Yes  / No  Odor: Yes  / No

PID Reading: \_\_\_\_\_ Conductivity: \_\_\_\_\_

Sample Description:

I21

PID Readings		

I21: 16.7  
J20: 1.7  
I20: 0.6  
J21: 1.3

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48,7825 - 10936



K17 L18

Sample ID: K17 L18 Date: 10/25/2017Time: 1445 Sampler: \_\_\_\_\_Contaminant: DRO, GRO, ESP, PH, SAR, ECSample Type: Grab    / Composite X Sample Depth: 3"Potential for Ground water: Low    / Med    / High X Est. Depth to Groundwater: \_\_\_\_\_Surface water Impact: Yes X / No    Sensitive Receptors: wetland \$Visual Staining: Yes    / No X Odor: Yes    / No XPID Reading: 4.6 Conductivity: \_\_\_\_\_

## Sample Description:

PID Readings		
2.3 L18	2.0 L17	
1.0 K18	1.7 K17	

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil SamplingProject #: JBO.MT.0124.01 County: Blaine State: MontanaLocation: Listou 21-35-18BQTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81ECoordinates: 48.7826 -109.39



KAL 20  
Sample ID: K17L18 Date: 10/25/2017

Time: 1425 Sampler: TBL MK CW

Contaminant: DRO, GRO, ESP, PH, SAR, EC

Sample Type: Grab  / Composite  Sample Depth: 3in

Potential for Ground water: Low  / Med  / High  Est. Depth to Groundwater:

Surface water Impact: Yes  / No  Sensitive Receptors:

Visual Staining: Yes  / No  Odor: Yes  / No

PID Reading: 25 Conductivity:

Sample Description:

V20: 1.4  
K20 = 2.5  
K20 = 1.2

PID Readings		

U7 0.4  
U9 3.4

Client: J. Burns Brown Operating Company Project: Listou Cleanup Confirmation Soil Sampling

Project #: JBO.MT.0124.01 County: Blaine State: Montana

Location: Listou 21-35-18B

QTR/QTR/T/R: NWNE/NENE Section 21, T35N, R81E

Coordinates: 48.7826 -109.38



## Appendix E – Photographic Log

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# Photographic Log

## Listou 21-35-18B Confirmation Soil Sampling (October 2017)

### Table of Contents

OVERVIEW .....	1
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MUDCRACK RELATED IMPACTS.....	15

## OVERVIEW



Photo No 1:

**Description:**  
Overview photograph of disturbed cleanup area. Looking north from SE corner of disturbance area.



Photo No 2:

**Description:**  
Overview photograph of the cleanup area. Looking south from near the location of Perimeter Sample 5 (P5). Note the extensive, small scale desiccation cracks present in the dried soil. Listou well and production facility in background.



Photo No 3:

**Description:**

Overview photograph of disturbed cleanup area. Looking west near location of Perimeter Sample 9 (P9). Pin flags were used to mark 25 ft. intervals along perimeter and within the grid. A pair of flags at a single location indicated the boundary of a section polyline.



Photo No 4:

**Description:**

Overview photograph of disturbance area. Looking south from near O16. Note mud cracks in foreground. Contaminated soil removed from the release area is stockpile in background of image.



Photo No 5:

**Description:**  
Overview photograph of disturbance area. Looking east from near L26. Water sample WS-M24 was collected from the water in image.



Photo No 6:

**Description:**  
Overview photograph of disturbance area. Looking southeast from near the location of Perimeter Sample 3 (P3).

## RELEASE CONTAINMENT DIKE



Photo No 7:

**Description:** Temporary containment dike installed across wetlands to prevent migration of crude oil. Looking east.



Photo No 8:

**Description:** Containment dike looking west. Taken in same location as Photo No 7.

## SAMPLING AREA



Photo No 9:

**Description:**  
Water pooling in most deeply excavated section. Origin of the water is likely snow melt. Water was sampled as WS-M24.



Photo No 10:

**Description:**  
Detail of water in Photo No 9. Water sample WS-M24 was collected from this location. Limited grease was seen along the edge of the water, no sheen was present.



Photo No 11:

**Description:**  
Location of background upland soil sample (BGU). Looking east. Location of wetlands soil background sample (BGW) is present in the background.



Photo No 12:

**Description:**  
Location and typical vegetation in the area that provided the background wetland soil sample (BGW).



Photo No 13:

**Description:**  
Flags spaced out for perimeter samples along eastern edge of disturbance area.  
Looking north.



Photo No 14:

**Description:**  
Flags spaced out for perimeter samples along southern edge of disturbance area.  
Looking south. Listou production facility in background.



Photo No 15:

**Description:**  
Flags spaced out for perimeter samples along southern edge of disturbance area.  
Looking east.



Photo No 16:

**Description:**  
Flags spaced out for perimeter samples along eastern edge of disturbance area.



Photo No 17:

**Description:**  
Flags spaced out for perimeter samples along southeastern edge of disturbance area. Listou production facility in background.



Photo No 18:

**Description:**  
Standing in cell E19F20 looking southeast into cell C18D19.



Photo No 19:

**Description:**  
Standing on the north end of E23H23, looking south. Listou production facility in background.



Photo No 20:

**Description:**  
Standing in I20, looking northwest across I20J21.



Photo No 21:

**Description:**  
Standing in G20,  
looking northwest  
across G20H21. Note  
desiccation cracks in  
the mud.



Photo No 22:

**Description:**  
Looking southeast  
into E19F20.



Photo No 23:

**Description:**  
Looking south into G18H19. Small areas of disturbance observed in the photo are from sampling operations.



Photo No 24:

**Description:**  
Looking southeast from G20.  
Hydrocarbon stained mudcracks in foreground (circled).

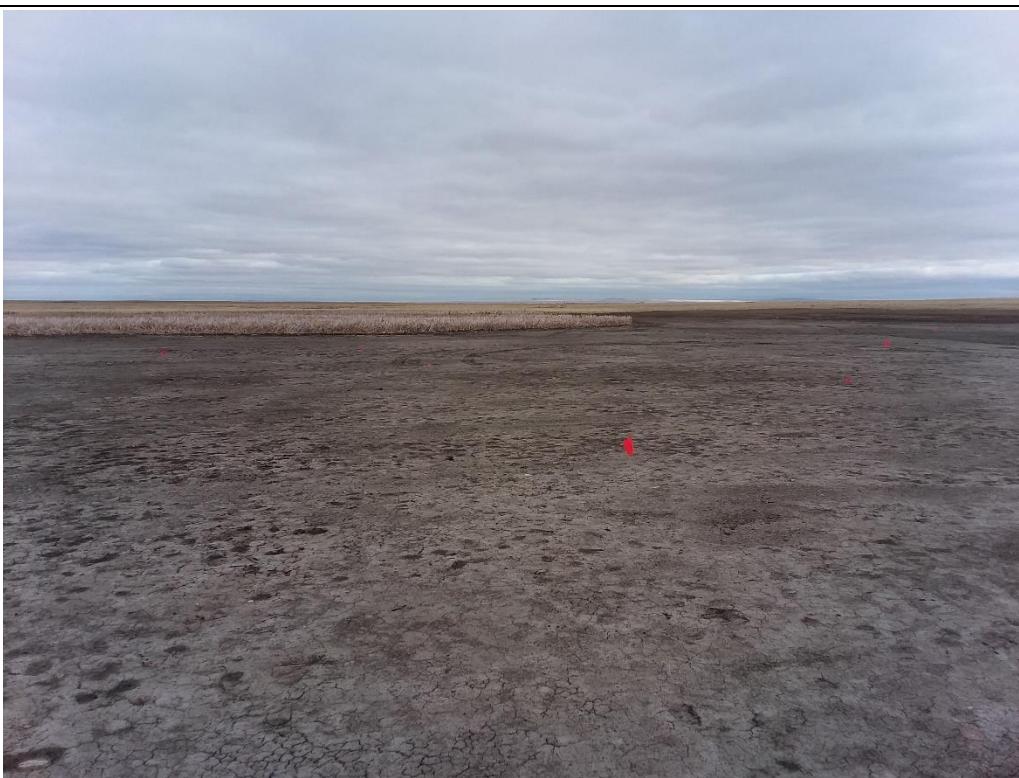


Photo No 25:

**Description:**  
Looking north from I 18J19 into M16O18 and K17L18.



Photo No 26:

**Description:**  
Looking north into sample M24O26 from I23K25. Water sample WS-M24 location in midground.



Photo No 27:

**Description:**  
Example aliquot sample.



Photo No 28:

**Description:**  
Orange paint indicated a sampled corner of a grid polygon. Aliquot sample locations can be seen in the foreground and midground (circled).

## MUDCRACK RELATED IMPACTS



Photo No 29:

**Description:** Visual hydrocarbon staining (slightly darker areas) associated with desiccation cracks in the mud in sample grid area G20H21. Wristwatch for scale. Desiccation cracks are small scale and the visual staining extend less than an inch in most areas.

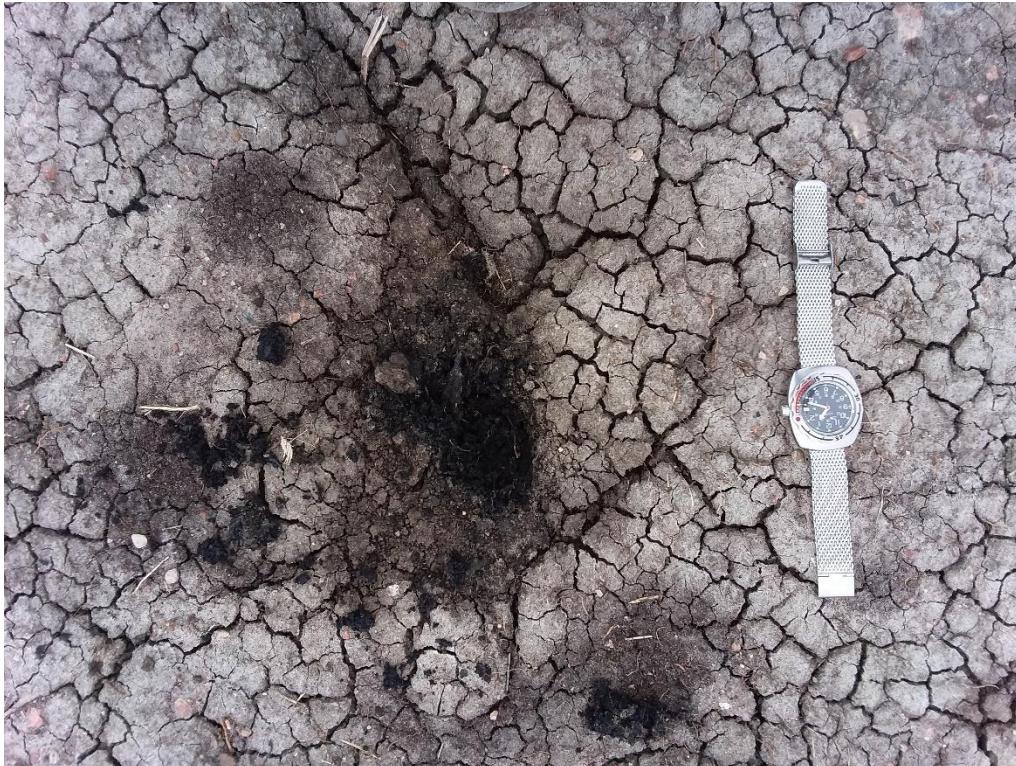


Photo No 30:

**Description:** Hydrocarbon staining along desiccation crack. A shovel was used to determine that staining extended four inches deep. Impacted area was located within I23K25 sample cell.



Photo No 31:

**Description:**  
Desiccation crack  
with hydrocarbon  
staining in sample  
cell K17L18.



Photo No 32:

**Description:**  
Small desiccation  
crack (boots for  
scale) in I23K25  
sample cell.



Photo No 33:

**Description:**

Hydrocarbon staining in desiccation cracks near K17L18 sample cell. Blue paint on ground near flag indicates that it was the center of a Type 1 sample.

**Appendix F – Analytical Results Summary Table with Comparison to  
Table 2 RBSL**

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**Appendix F-1: Analytical results summary table with comparison to Table 2 RBSL cleanup limits**

COC (mg/kg)	Grid Location																		RBCA RBSL
	P0-P1	P1-P2	P2-P3	P3-P4	P4-P5	P5-P6	P6-P7	P7-P8	P8-P9	P9-P10	P9-P10 Dup	P10-P11	N21O23	N21O23 Dup	WS-M24	BGW (Background)	BGU (Background)		
Date	10/24/2017	10/24/2017	10/24/2017	10/24/2017	10/24/2017	10/24/2017	10/24/2017	10/24/2017	10/24/2017	10/24/2017	10/24/2017	10/24/2017	10/26/2017	10/26/2017	10/24/2017	10/24/2017	10/24/2017	RBCA RBSL	
EPH Screen	11.9	8.58	21	<20	9.72	1020	9.87	12.5	12.8	60.7	23.6	12.9	40.7	38.5	1.03	71.7	102	200	
<b>EPH Fractionation</b>																			
C9-C18 Aliphatics	-	-	-	-	-	78	-	-	-	-	-	-	-	-	-	-	-	900	
C19-C36 Aliphatics	-	-	-	-	-	292	-	-	-	-	-	-	-	-	-	-	-	200,000	
C11-C22 Aromatics	-	-	-	-	-	431	-	-	-	-	-	-	-	-	-	-	-	370	
<b>VPH</b>																			
Total VPH	<13.2	<12.4	<11.2	<11.5	<11.3	<11.0	<12.3	<11	<10	<11.2	<11.0	<12.7	<13.4	<10.8	<0.2	<10.0	<10.0	NA	
C5-C8 Aliphatics	<6.6	<6.2	<5.6	<5.5	<5.65	<5.5	<6.15	<5.5	<5.0	<5.6	<5.6	<6.35	<6.7	<5.4	<0.1	<5.0	<5.0	220	
C9-C12 Aliphatics	<6.6	<6.2	<5.6	<5.5	<5.65	<5.5	<6.15	<5.5	<5.0	<5.6	<5.6	<6.35	<6.7	<5.4	<0.1	<5.0	<5.0	640	
C9-C10 Aromatics	2.49	2.32	2.11	1.96	2.22	1.98	2.19	1.84	2.64	2.53	<5.5	2.65	<6.7	<5.4	<0.1	1.71	<5.0	130	
<b>PAH</b>																			
Anthracene	-	-	-	-	-	0.000683	-	-	-	-	-	-	-	-	<0.00005	<0.006	<0.006	2200	
Acenaphthene	-	-	-	-	-	<0.006	-	-	-	-	-	-	-	-	<0.00005	<0.006	<0.006	21	
Acenaphthylene	-	-	-	-	-	<0.006	-	-	-	-	-	-	-	-	<0.00005	<0.006	<0.006	NS	
Benzo(A)Anthracene	-	-	-	-	-	<0.006	-	-	-	-	-	-	-	-	<0.00005	<0.006	<0.006	1.3	
Benzo(A)Pyrene	-	-	-	-	-	<0.006	-	-	-	-	-	-	-	-	<0.00005	0.00212	<0.006	0.13	
Benzo(B)Fluoranthene	-	-	-	-	-	<0.006	-	-	-	-	-	-	-	-	<0.00005	0.00162	<0.006	1.3	
Benzo(G,H,I)Perylene	-	-	-	-	-	0.00174	-	-	-	-	-	-	-	-	<0.00005	0.00324	<0.006	NS	
Benzo(K)Fluoranthene	-	-	-	-	-	<0.006	-	-	-	-	-	-	-	-	<0.00005	0.00378	<0.006	230	
Chrysene	-	-	-	-	-	0.00172	-	-	-	-	-	-	-	-	<0.00005	<0.006	<0.006	690	
Dibenz(A,H)Anthracene	-	-	-	-	-	<0.006	-	-	-	-	-	-	-	-	<0.00005	<0.006	<0.006	7.5	
Fluoranthene	-	-	-	-	-	0.000943	-	-	-	-	-	-	-	-	<0.00005	<0.006	<0.006	85	
Fluorene	-	-	-	-	-	<0.006	-	-	-	-	-	-	-	-	0.000014	<0.006	<0.006	35	
Indeno(1,2,3-Cd)Pyrene	-	-	-	-	-	<0.006	-	-	-	-	-	-	-	-	<0.00005	<0.006	<0.006	77	
Naphthalene	-	-	-	-	-	<0.02	-	-	-	-	-	-	-	-	<0.00025	<0.02	<0.02	12	
Phenanthrene	-	-	-	-	-	0.00119	-	-	-	-	-	-	-	-	<0.00005	<0.006	<0.006	NS	
Pyrene	-	-	-	-	-	0.00222	-	-	-	-	-	-	-	-	<0.00005	<0.006	<0.006	83	
1-Methylnaphthalene	-	-	-	-	-	<0.02	-	-	-	-	-	-	-	-	<0.00025	<0.02	<0.02	2.1	
2-Methylnaphthalene	-	-	-	-	-	<0.02	-	-	-	-	-	-	-	-	<0.00025	<0.02	<0.02	6.9	
2-Chloronaphthalene	-	-	-	-	-	<0.02	-	-	-	-	-	-	-	-	<0.00025	<0.02	<0.02	NS	

Notes: All values presented are in mg/kg

(-) = Not Analyzed

RBCA RBSL = values based on MDEQ commercial cleanup standards (Table 2 – Subsurface Soil) with depth to groundwater <10 ft.

**Appendix F-2: Analytical results summary table with comparison to Table 2 RBSL cleanup limits**

COC (mg/kg)	Grid Location																			RBCA RBSL
	C20D21	E19F20	M27N28	G18H19	I18J19	K17L18	K19L20	C22D23	E21F22	E23H23	I23K25	M24O26	G20H21	G20H21 Dup	I20J21	Q14R15	C18D19	M16O18		
	Date	10/25/2017	10/25/2017	10/26/2017	10/25/2017	10/25/2017	10/25/2017	10/25/2017	10/25/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/25/2017	10/25/2017	10/25/2017	10/25/2017	10/26/2017	10/26/2017	
EPH Screen	25.1	10.3	11.0	56.8	385.0	152.0	61.5	41.7	43.8	191	251	33.5	2590	153	562	118	125	57.7	200	
<b>EPH Fractionation</b>																				
C9-C18 Aliphatics	-	-	-	-	41.2	-	-	-	-	-	26.0	-	591	-	60.8	-	-	-	900	
C19-C36 Aliphatics	-	-	-	-	87.9	-	-	-	-	-	61.9	-	1210	-	130.0	-	-	-	200,000	
C11-C22 Aromatics	-	-	-	-	118.0	-	-	-	-	-	73.2	-	1520	-	145.0	-	-	-	370	
<b>VPH</b>																				
Total VPH	<10.0	<12.1	<12.4	37.7	<10.0	-	-	<10.4	<10.0	5.36	5.36	13.2	22.8	13.2	5.42	<14.7	<11.1	<10.7	NA	
C5-C8 Aliphatics	<5.0	<6.05	<6.2	<5.75	<5.0	-	-	<5.2	<5.0	<5.2	<5.2	10.2	2.25	2.36	<5.0	<7.35	<5.55	<5.35	220	
C9-C12 Aliphatics	<5.0	<6.05	<6.2	23.5	<5.0	-	-	<5.2	<5.0	2.38	3.8	3.02	11.5	11.4	2.43	<7.35	2.45	<5.35	640	
C9-C10 Aromatics	1.76	2.24	2.71	14.2	2.45	-	-	2.8	<5.0	3.98	2.98	<5.65	9.02	9.08	2.99	2.75	<5.55	<5.35	130	
<b>PAH</b>																				
Anthracene	-	-	-	-	0.00447	-	-	-	-	-	0.01	-	0.107	-	0.00491	-	-	-	2200	
Acenaphthene	-	-	-	-	0.00439	-	-	-	-	-	0.00892	-	0.133	-	0.00494	-	-	-	21	
Acenaphthylene	-	-	-	-	0.00137	-	-	-	-	-	0.00291	-	0.0297	-	0.00141	-	-	-	ns	
Benzo(A)Anthracene	-	-	-	-	0.000975	-	-	-	-	-	0.00192	-	0.0166	-	0.000991	-	-	-	1.3	
Benzo(A)Pyrene	-	-	-	-	<0.006	-	-	-	-	-	0.00132	-	0.0146	-	<0.006	-	-	-	0.13	
Benzo(B)Fluoranthene	-	-	-	-	<0.006	-	-	-	-	-	0.00819	-	0.0357	-	0.00138	-	-	-	1.3	
Benzo(G,H,I)Perylene	-	-	-	-	0.00119	-	-	-	-	-	0.00247	-	0.0212	-	0.0015	-	-	-	ns	
Benzo(K)Fluoranthene	-	-	-	-	<0.006	-	-	-	-	-	0.00102	-	0.0109	-	<0.006	-	-	-	230	
Chrysene	-	-	-	-	0.00443	-	-	-	-	-	0.00956	-	0.0789	-	0.00467	-	-	-	690	
Dibenz(A,H)Anthracene	-	-	-	-	<0.006	-	-	-	-	-	0.000851	-	0.00793	-	<0.006	-	-	-	7.5	
Fluoranthene	-	-	-	-	0.00248	-	-	-	-	-	0.00358	-	0.039	-	0.00175	-	-	-	85	
Fluorene	-	-	-	-	0.00846	-	-	-	-	-	0.0183	-	0.176	-	0.0091	-	-	-	35	
Indeno(1,2,3-Cd)Pyrene	-	-	-	-	<0.006	-	-	-	-	-	<0.006	-	<0.06	-	<0.006	-	-	-	77	
Naphthalene	-	-	-	-	0.00489	-	-	-	-	-	0.0033	-	0.0402	-	<0.02	-	-	-	12	
Phenanthrene	-	-	-	-	0.02	-	-	-	-	-	0.0398	-	0.468	-	0.0217	-	-	-	ns	
Pyrene	-	-	-	-	0.00628	-	-	-	-	-	0.0127	-	0.116	-	0.00604	-	-	-	83	
1-Methylnaphthalene	-	-	-	-	0.0175	-	-	-	-	-	0.0335	-	0.253	-	0.0123	-	-	-	2.1	
2-Methylnaphthalene	-	-	-	-	0.00259	-	-	-	-	-	0.0247	-	0.219	-	0.00365	-	-	-	6.9	
2-Chloronaphthalene	-	-	-	-	<0.02	-	-	-	-	-	<0.02	-	<0.2	-	<0.02	-	-	-	ns	

Notes: All values presented are in mg/kg

(-) = Not Analyzed

RBCA RBSL = values based on MDEQ commercial cleanup standards (Table 2 – Subsurface Soil) with depth to groundwater <10 ft.



**Appendix G – Laboratory Analysis Report and COC**

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November 30, 2017

## Absaroka Energy & Environmental - WY

Sample Delivery Group: L947437  
Samples Received: 10/31/2017  
Project Number: JBO.MT.0124.01  
Description: Listou 21-35-18B

Report To: Randolph Moses  
112 High St  
Buffalo, WY 82834

Entire Report Reviewed By:



Shane Gambill  
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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ONE LAB. NATIONWIDE.



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<b>Ss: Sample Summary</b>	<b>4</b>	<b>3 Ss</b>
<b>Cn: Case Narrative</b>	<b>11</b>	<b>4 Cn</b>
<b>Sr: Sample Results</b>	<b>12</b>	<b>5 Sr</b>
P2-P3 L947437-01	12	6 Qc
P3-P4 L947437-02	13	7 GI
P4-P5 L947437-03	14	8 Al
P5-P6 L947437-04	15	9 Sc
P6-P7 L947437-05	17	
P7-P8 L947437-06	18	
P8-P9 L947437-07	19	
P10-P11 L947437-09	20	
C20D21 L947437-11	21	
E19F20 L947437-12	22	
BGU L947437-13	23	
BGU L947437-14	25	
BGW L947437-15	26	
BGW L947437-16	28	
P0-P1 L947437-17	29	
P1-P2 L947437-18	30	
M27N28 L947437-19	31	
G18H19 L947437-20	32	
I18J19 L947437-21	33	
K17L18 L947437-22	35	
K19L20 L947437-23	36	
C22D23 L947437-24	37	
E21F22 L947437-25	38	
E23H23 L947437-26	39	
I23K25 L947437-27	40	
C18D19 L947437-29	42	
M24O26 L947437-30	43	
G20H21 L947437-31	44	
I20J21 L947437-32	46	
Q14R15 L947437-33	48	
M16O18 L947437-34	49	
G20H21-COMP L947437-35	50	
WS-M24 L947437-36	51	
P9-P10 L947437-37	53	
P9-P10 L947437-38	54	



N21O23 L947437-39	55	<sup>1</sup> Cp
N21O23 L947437-40	56	<sup>2</sup> Tc
<b>Qc: Quality Control Summary</b>	<b>57</b>	<sup>3</sup> Ss
<b>Total Solids by Method 2540 G-2011</b>	<b>57</b>	<sup>4</sup> Cn
<b>Total Solids by Method 2540B</b>	<b>62</b>	<sup>5</sup> Sr
<b>Wet Chemistry by Method 9040C</b>	<b>63</b>	<sup>6</sup> Qc
<b>Wet Chemistry by Method 9045D</b>	<b>64</b>	<sup>7</sup> Gl
<b>Wet Chemistry by Method 9050A</b>	<b>65</b>	<sup>8</sup> Al
<b>Wet Chemistry by Method 9050AMod</b>	<b>66</b>	<sup>9</sup> Sc
<b>Wet Chemistry by Method 9056A</b>	<b>67</b>	
<b>Mercury by Method 7470A</b>	<b>69</b>	
<b>Metals (ICP) by Method 6010B</b>	<b>70</b>	
<b>Volatile Petroleum Hydrocarbons by Method MTDEQ VPH</b>	<b>71</b>	
<b>Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH</b>	<b>74</b>	
<b>Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM</b>	<b>81</b>	
<b>Gl: Glossary of Terms</b>	<b>89</b>	
<b>Al: Accreditations &amp; Locations</b>	<b>90</b>	
<b>Sc: Sample Chain of Custody</b>	<b>91</b>	

## SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## P2-P3 L947437-01 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038719	1	11/03/17 17:19	11/03/17 17:20	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	56	11/01/17 18:05	11/01/17 18:05	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 01:39	DMG

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## P3-P4 L947437-02 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038719	1	11/03/17 17:19	11/03/17 17:20	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	57.5	11/01/17 18:37	11/01/17 18:37	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 02:24	DMG

## P4-P5 L947437-03 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038722	1	11/03/17 16:44	11/03/17 16:55	KDW
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	56.5	11/01/17 19:10	11/01/17 19:10	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 02:39	DMG

## P5-P6 L947437-04 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038722	1	11/03/17 16:44	11/03/17 16:55	KDW
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	55	11/01/17 19:43	11/01/17 19:43	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 02:54	DMG
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1038531	1	11/01/17 14:45	11/20/17 14:06	ACM
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1038531	20	11/01/17 14:45	11/21/17 10:34	ACM
Semi-Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1039976	1	11/07/17 14:09	11/07/17 17:15	DMG

Collected by      Collected date/time      Received date/time  
10/24/17 15:50      10/31/17 08:45

## P6-P7 L947437-05 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038722	1	11/03/17 16:44	11/03/17 16:55	KDW
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	61.5	11/01/17 20:16	11/01/17 20:16	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/06/17 14:57	ACM

Collected by      Collected date/time      Received date/time  
10/24/17 16:00      10/31/17 08:45

## P7-P8 L947437-06 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038722	1	11/03/17 16:44	11/03/17 16:55	KDW
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	55	11/01/17 20:48	11/01/17 20:48	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/06/17 15:12	ACM

## SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## P8-P9 L947437-07 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038722	1	11/03/17 16:44	11/03/17 16:55	KDW
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	50	11/01/17 21:21	11/01/17 21:21	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/06/17 15:27	ACM

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## P10-P11 L947437-09 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038722	1	11/03/17 16:44	11/03/17 16:55	KDW
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	63.5	11/01/17 21:54	11/01/17 21:54	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/06/17 15:42	ACM

## C20D21 L947437-11 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038722	1	11/03/17 16:44	11/03/17 16:55	KDW
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	50	11/01/17 22:26	11/01/17 22:26	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 04:08	DMG

## E19F20 L947437-12 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038722	1	11/03/17 16:44	11/03/17 16:55	KDW
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	60.5	11/01/17 22:59	11/01/17 22:59	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 04:22	DMG

## BGU L947437-13 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG1037861	1	11/01/17 15:58	11/02/17 10:56	CCE
Total Solids by Method 2540 G-2011	WG1038722	1	11/03/17 16:44	11/03/17 16:55	KDW
Wet Chemistry by Method 9045D	WG1039705	1	11/07/17 12:30	11/07/17 13:32	ER
Wet Chemistry by Method 9050AMod	WG1039684	1	11/07/17 14:44	11/07/17 15:29	TH
Wet Chemistry by Method 9056A	WG1038165	1	11/02/17 12:03	11/03/17 07:20	KCF
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	50	11/01/17 23:32	11/01/17 23:32	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 04:37	DMG
Semi-Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1039404	1	11/06/17 22:13	11/07/17 10:05	KMP

## BGU L947437-14 Waste

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Preparation by Method 1311	WG1038342	1	11/02/17 12:24	11/02/17 12:24	TM
Mercury by Method 7470A	WG1038736	1	11/03/17 10:57	11/03/17 14:54	ABL
Metals (ICP) by Method 6010B	WG1038702	1	11/03/17 09:35	11/03/17 14:51	CCE

## SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## BGW L947437-15 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG1037861	1	11/01/17 15:58	11/02/17 11:05	CCE
Total Solids by Method 2540 G-2011	WG1038722	1	11/03/17 16:44	11/03/17 16:55	KDW
Wet Chemistry by Method 9045D	WG1039705	1	11/07/17 12:30	11/07/17 13:32	ER
Wet Chemistry by Method 9050AMod	WG1039684	1	11/07/17 14:44	11/07/17 15:29	TH
Wet Chemistry by Method 9056A	WG1038165	1	11/02/17 12:03	11/03/17 07:40	KCF
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	50	11/02/17 00:04	11/02/17 00:04	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 04:51	DMG
Semi-Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1039404	1	11/06/17 22:13	11/07/17 10:27	KMP

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 GI
- 8 Al
- 9 Sc

## BGW L947437-16 Waste

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Preparation by Method 1311	WG1038342	1	11/02/17 12:24	11/02/17 12:24	TM
Mercury by Method 7470A	WG1038736	1	11/03/17 10:57	11/03/17 14:57	ABL
Metals (ICP) by Method 6010B	WG1038702	1	11/03/17 09:35	11/03/17 14:54	CCE

## PO-P1 L947437-17 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038724	1	11/03/17 17:37	11/03/17 17:37	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	66	11/02/17 00:37	11/02/17 00:37	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 05:06	DMG

## P1-P2 L947437-18 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038724	1	11/03/17 17:37	11/03/17 17:37	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	62	11/02/17 01:10	11/02/17 01:10	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 05:20	DMG

## M27N28 L947437-19 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038724	1	11/03/17 17:37	11/03/17 17:37	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	62	11/02/17 01:42	11/02/17 01:42	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037727	1	11/01/17 14:45	11/04/17 05:35	DMG

## G18H19 L947437-20 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038724	1	11/03/17 17:37	11/03/17 17:37	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	57.5	11/02/17 02:15	11/02/17 02:15	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 16:35	ACM

## SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## I18J19 L947437-21 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038724	1	11/03/17 17:37	11/03/17 17:37	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	50	11/02/17 02:48	11/02/17 02:48	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 17:20	DMG
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1044760	1	11/01/17 14:44	11/20/17 16:12	ACM
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1044760	1	11/01/17 14:44	11/21/17 09:52	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1039976	1	11/07/17 14:09	11/08/17 20:59	KMP

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## K17L18 L947437-22 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038724	1	11/03/17 17:37	11/03/17 17:37	JD
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 17:34	DMG

## K19L20 L947437-23 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038724	1	11/03/17 17:37	11/03/17 17:37	JD
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 17:49	ACM

## C22D23 L947437-24 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038724	1	11/03/17 17:37	11/03/17 17:37	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037695	52	11/02/17 03:53	11/02/17 03:53	JAH
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 18:04	DMG

## E21F22 L947437-25 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038724	1	11/03/17 17:37	11/03/17 17:37	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	50	11/06/17 18:58	11/06/17 18:58	LRL
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 18:19	DMG

## E23H23 L947437-26 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038724	1	11/03/17 17:37	11/03/17 17:37	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	58	11/06/17 19:31	11/06/17 19:31	LRL
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 22:29	DMG

## SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## I23K25 L947437-27 Solid

Collected by  
10/26/17 11:45

Collected date/time  
10/31/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038727	1	11/03/17 14:14	11/03/17 14:15	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	52	11/06/17 20:03	11/06/17 20:03	RLR
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 22:43	DMG
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1044760	1	11/01/17 14:44	11/20/17 16:32	ACM
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1044760	1	11/01/17 14:44	11/21/17 09:32	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1039976	1	11/07/17 14:09	11/07/17 19:53	DMG

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## C18D19 L947437-29 Solid

Collected by  
10/26/17 09:30

Collected date/time  
10/31/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038727	1	11/03/17 14:14	11/03/17 14:15	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	55.5	11/06/17 20:36	11/06/17 20:36	RLR
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 22:58	DMG

## M24O26 L947437-30 Solid

Collected by  
10/26/17 12:30

Collected date/time  
10/31/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038727	1	11/03/17 14:14	11/03/17 14:15	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	56.5	11/06/17 21:09	11/06/17 21:09	RLR
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 23:13	ACM

## G20H21 L947437-31 Solid

Collected by  
10/25/17 12:45

Collected date/time  
10/31/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038727	1	11/03/17 14:14	11/03/17 14:15	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	50	11/06/17 21:41	11/06/17 21:41	RLR
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	5	11/01/17 14:44	11/04/17 00:40	LKD
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1044760	20	11/01/17 14:44	11/22/17 15:34	ACM
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1044760	5	11/01/17 14:44	11/21/17 10:13	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1039976	10	11/07/17 14:09	11/07/17 20:37	DMG

## I20J21 L947437-32 Solid

Collected by  
10/25/17 13:35

Collected date/time  
10/31/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038727	1	11/03/17 14:14	11/03/17 14:15	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	50	11/06/17 22:14	11/06/17 22:14	RLR
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 23:42	DMG
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1044760	1	11/01/17 14:44	11/20/17 15:30	ACM
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1044760	1	11/01/17 14:44	11/20/17 15:51	ACM
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1040582	1	11/08/17 19:41	11/09/17 11:54	KMP

## SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



## Q14R15 L947437-33 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038727	1	11/03/17 14:14	11/03/17 14:15	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	73.5	11/06/17 22:47	11/06/17 22:47	LRL
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/03/17 23:56	DMG

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## M16O18 L947437-34 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038727	1	11/03/17 14:14	11/03/17 14:15	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	53.5	11/06/17 23:20	11/06/17 23:20	LRL
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/04/17 00:11	ACM

## G20H21-COMP L947437-35 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038727	1	11/03/17 14:14	11/03/17 14:15	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	50	11/06/17 23:53	11/06/17 23:53	LRL
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1037733	1	11/01/17 14:44	11/04/17 00:26	DMG

## WS-M24 L947437-36 GW

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG1039800	1	11/07/17 08:45	11/07/17 10:48	TRB
Total Solids by Method 2540B	WG1037624	1	11/01/17 13:07	11/01/17 13:28	MMF
Wet Chemistry by Method 9040C	WG1038747	1	11/06/17 11:00	11/06/17 11:00	ER
Wet Chemistry by Method 9050A	WG1037573	1	11/01/17 11:57	11/01/17 11:57	TH
Wet Chemistry by Method 9056A	WG1038187	20	11/02/17 20:31	11/02/17 20:31	KCF
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037618	1	11/01/17 03:42	11/01/17 03:42	ACG
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1040258	1	11/08/17 08:12	11/09/17 02:37	ACM
Semi-Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1038000	1	11/01/17 22:20	11/03/17 07:45	FMB

## P9-P10 L947437-37 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038727	1	11/03/17 14:14	11/03/17 14:15	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	56	11/07/17 00:25	11/07/17 00:25	LRL
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1038383	1	11/02/17 17:07	11/07/17 01:10	ACM

## P9-P10 L947437-38 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038727	1	11/03/17 14:14	11/03/17 14:15	JD
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	55	11/07/17 00:58	11/07/17 00:58	LRL
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1038383	1	11/02/17 17:07	11/07/17 01:27	ACM

## SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



N21O23 L947437-39 Solid

Collected by  
10/26/17 13:20

Collected date/time  
10/31/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038730	1	11/03/17 15:20	11/03/17 15:57	KDW
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	67	11/07/17 01:31	11/07/17 01:31	RLR
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1038383	1	11/02/17 17:07	11/07/17 02:19	ACM

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

N21O23 L947437-40 Solid

Collected by  
10/26/17 13:25

Collected date/time  
10/31/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1038730	1	11/03/17 15:20	11/03/17 15:57	KDW
Volatile Petroleum Hydrocarbons by Method MTDEQ VPH	WG1037698	54	11/07/17 02:04	11/07/17 02:04	RLR
Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH	WG1038383	1	11/02/17 17:07	11/07/17 02:36	ACM



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Shane Gambill  
Technical Service Representative

#### Project Narrative

Due to multiple preparation procedures, calculated analytes are not reported in the quality control samples for EPH and VPH Methods.

- <sup>1</sup> Cp
- <sup>2</sup> Tc
- <sup>3</sup> Ss
- <sup>4</sup> Cn
- <sup>5</sup> Sr
- <sup>6</sup> Qc
- <sup>7</sup> GI
- <sup>8</sup> AI
- <sup>9</sup> Sc



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	89.5		1	11/03/2017 17:20	<a href="#">WG1038719</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.86	5.60	56	11/01/2017 18:05	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.86	5.60	56	11/01/2017 18:05	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	2.11	<u>B J</u>	1.86	5.60	56	11/01/2017 18:05	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.86	5.60	56	11/01/2017 18:05	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.86	5.60	56	11/01/2017 18:05	<a href="#">WG1037695</a>
Total VPH	U		3.74	11.2	56	11/01/2017 18:05	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	92.2			70.0-130		11/01/2017 18:05	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	79.5			70.0-130		11/01/2017 18:05	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	21.0	<u>T8</u>	7.10	20.0	1	11/04/2017 01:39	<a href="#">WG1037727</a>
(S) o-Terphenyl	112			40.0-140		11/04/2017 01:39	<a href="#">WG1037727</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	69.1		1	11/03/2017 17:20	<a href="#">WG1038719</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.91	5.75	57.5	11/01/2017 18:37	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.91	5.75	57.5	11/01/2017 18:37	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	1.96	<u>B J</u>	1.91	5.75	57.5	11/01/2017 18:37	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.91	5.75	57.5	11/01/2017 18:37	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.91	5.75	57.5	11/01/2017 18:37	<a href="#">WG1037695</a>
Total VPH	U		3.84	11.5	57.5	11/01/2017 18:37	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	94.7			70.0-130		11/01/2017 18:37	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	80.4			70.0-130		11/01/2017 18:37	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	U	<u>T8</u>	7.10	20.0	1	11/04/2017 02:24	<a href="#">WG1037727</a>
(S) o-Terphenyl	94.8			40.0-140		11/04/2017 02:24	<a href="#">WG1037727</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	80.9	J3	1	11/03/2017 16:55	<a href="#">WG1038722</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.88	5.65	56.5	11/01/2017 19:10	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.88	5.65	56.5	11/01/2017 19:10	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	2.22	<u>B J</u>	1.88	5.65	56.5	11/01/2017 19:10	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.88	5.65	56.5	11/01/2017 19:10	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.88	5.65	56.5	11/01/2017 19:10	<a href="#">WG1037695</a>
Total VPH	U		3.77	11.3	56.5	11/01/2017 19:10	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	93.3			70.0-130		11/01/2017 19:10	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	79.4			70.0-130		11/01/2017 19:10	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	9.72	<u>J T8</u>	7.10	20.0	1	11/04/2017 02:39	<a href="#">WG1037727</a>
(S) o-Terphenyl	84.5			40.0-140		11/04/2017 02:39	<a href="#">WG1037727</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	82.1		1	11/03/2017 16:55	<a href="#">WG1038722</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.83	5.50	55	11/01/2017 19:43	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.83	5.50	55	11/01/2017 19:43	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	1.98	<u>B J</u>	1.83	5.50	55	11/01/2017 19:43	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.83	5.50	55	11/01/2017 19:43	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.83	5.50	55	11/01/2017 19:43	<a href="#">WG1037695</a>
Total VPH	U		3.67	11.0	55	11/01/2017 19:43	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	95.0			70.0-130		11/01/2017 19:43	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	81.3			70.0-130		11/01/2017 19:43	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	1020	<u>T8</u>	7.10	20.0	1	11/04/2017 02:54	<a href="#">WG1037727</a>
Unadjusted C9-C18 Aliphatics	78.0	<u>T8</u>	6.67	20.0	1	11/20/2017 14:06	<a href="#">WG1038531</a>
Unadjusted C19-C36 Aliphatics	292	<u>T8</u>	6.67	20.0	1	11/20/2017 14:06	<a href="#">WG1038531</a>
Unadjusted C11-C22 Aromatics	431	<u>B T8</u>	133	400	20	11/21/2017 10:34	<a href="#">WG1038531</a>
Unadjusted Total Petroleum Hydrocarbons	801	<u>B T8</u>	133	400	20	11/21/2017 10:34	<a href="#">WG1038531</a>
Adjusted C11-C22 Aromatics	431	<u>T8</u>	133	400	20	11/21/2017 10:34	<a href="#">WG1038531</a>
Adjusted Total Petroleum Hydrocarbons	801	<u>T8</u>	133	400	20	11/21/2017 10:34	<a href="#">WG1038531</a>
(S) o-Terphenyl	79.9			40.0-140		11/04/2017 02:54	<a href="#">WG1037727</a>
(S) o-Terphenyl	77.8	<u>J7</u>		40.0-140		11/21/2017 10:34	<a href="#">WG1038531</a>
(S) 1-Chloro-octadecane	62.8			40.0-140		11/20/2017 14:06	<a href="#">WG1038531</a>
(S) 2-Fluorobiphenyl	91.4	<u>J7</u>		40.0-140		11/21/2017 10:34	<a href="#">WG1038531</a>
(S) 2-Bromonaphthalene	108	<u>J7</u>		40.0-140		11/21/2017 10:34	<a href="#">WG1038531</a>

## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Anthracene	0.000683	<u>J</u>	0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Acenaphthene	U		0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Acenaphthylene	U		0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Benzo(a)anthracene	U		0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Benzo(a)pyrene	U		0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Benzo(b)fluoranthene	U		0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Benzo(g,h,i)perylene	0.00174	<u>J</u>	0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Benzo(k)fluoranthene	U		0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Chrysene	0.00172	<u>J</u>	0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Dibenz(a,h)anthracene	U	<u>J3</u>	0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Fluoranthene	0.000943	<u>J J3</u>	0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Fluorene	U		0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Indeno(1,2,3-cd)pyrene	U	<u>J3</u>	0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Naphthalene	U		0.00200	0.0200	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Phenanthrene	0.00119	<u>J</u>	0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
Pyrene	0.00222	<u>J</u>	0.000600	0.00600	1	11/07/2017 17:15	<a href="#">WG1039976</a>
1-Methylnaphthalene	U		0.00200	0.0200	1	11/07/2017 17:15	<a href="#">WG1039976</a>
2-Methylnaphthalene	U		0.00200	0.0200	1	11/07/2017 17:15	<a href="#">WG1039976</a>
2-Chloronaphthalene	U		0.00200	0.0200	1	11/07/2017 17:15	<a href="#">WG1039976</a>
(S) p-Terphenyl-d14	91.1			23.0-120		11/07/2017 17:15	<a href="#">WG1039976</a>



## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch	
(S) Nitrobenzene-d5	82.7			14.0-149		11/07/2017 17:15	WG1039976	<sup>1</sup> Cp
(S) 2-Fluorobiphenyl	79.6			34.0-125		11/07/2017 17:15	WG1039976	<sup>2</sup> Tc

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	49.2		1	11/03/2017 16:55	<a href="#">WG1038722</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		2.05	6.15	61.5	11/01/2017 20:16	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		2.05	6.15	61.5	11/01/2017 20:16	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	2.19	<u>B J</u>	2.05	6.15	61.5	11/01/2017 20:16	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		2.05	6.15	61.5	11/01/2017 20:16	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		2.05	6.15	61.5	11/01/2017 20:16	<a href="#">WG1037695</a>
Total VPH	U		4.10	12.3	61.5	11/01/2017 20:16	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	95.3			70.0-130		11/01/2017 20:16	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	82.0			70.0-130		11/01/2017 20:16	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	9.87	<u>J T8</u>	7.10	20.0	1	11/06/2017 14:57	<a href="#">WG1037727</a>
(S) o-Terphenyl	82.2			40.0-140		11/06/2017 14:57	<a href="#">WG1037727</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	80.6		1	11/03/2017 16:55	<a href="#">WG1038722</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.83	5.50	55	11/01/2017 20:48	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.83	5.50	55	11/01/2017 20:48	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	1.84	<u>B J</u>	1.83	5.50	55	11/01/2017 20:48	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.83	5.50	55	11/01/2017 20:48	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.83	5.50	55	11/01/2017 20:48	<a href="#">WG1037695</a>
Total VPH	U		3.67	11.0	55	11/01/2017 20:48	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	96.3			70.0-130		11/01/2017 20:48	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	81.2			70.0-130		11/01/2017 20:48	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	12.5	<u>J T8</u>	7.10	20.0	1	11/06/2017 15:12	<a href="#">WG1037727</a>
(S) o-Terphenyl	106			40.0-140		11/06/2017 15:12	<a href="#">WG1037727</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	69.3		1	11/03/2017 16:55	<a href="#">WG1038722</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/01/2017 21:21	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/01/2017 21:21	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	U		1.66	5.00	50	11/01/2017 21:21	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/01/2017 21:21	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/01/2017 21:21	<a href="#">WG1037695</a>
Total VPH	U		3.34	10.0	50	11/01/2017 21:21	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	94.0			70.0-130		11/01/2017 21:21	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	81.7			70.0-130		11/01/2017 21:21	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	12.8	<a href="#">JT8</a>	7.10	20.0	1	11/06/2017 15:27	<a href="#">WG1037727</a>
(S) o-Terphenyl	98.7			40.0-140		11/06/2017 15:27	<a href="#">WG1037727</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	74.8		1	11/03/2017 16:55	<a href="#">WG1038722</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		2.11	6.35	63.5	11/01/2017 21:54	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		2.11	6.35	63.5	11/01/2017 21:54	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	2.64	<u>B J</u>	2.11	6.35	63.5	11/01/2017 21:54	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		2.11	6.35	63.5	11/01/2017 21:54	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		2.11	6.35	63.5	11/01/2017 21:54	<a href="#">WG1037695</a>
Total VPH	U		4.24	12.7	63.5	11/01/2017 21:54	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	96.0			70.0-130		11/01/2017 21:54	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	82.5			70.0-130		11/01/2017 21:54	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	12.9	<u>J T8</u>	7.10	20.0	1	11/06/2017 15:42	<a href="#">WG1037727</a>
(S) o-Terphenyl	107			40.0-140		11/06/2017 15:42	<a href="#">WG1037727</a>

C20D21

Collected date/time: 10/25/17 09:10

## SAMPLE RESULTS - 11

L947437

ONE LAB. NATIONWIDE.



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	79.6		1	11/03/2017 16:55	<a href="#">WG1038722</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/01/2017 22:26	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/01/2017 22:26	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	1.76	<u>B J</u>	1.66	5.00	50	11/01/2017 22:26	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/01/2017 22:26	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/01/2017 22:26	<a href="#">WG1037695</a>
Total VPH	U		3.34	10.0	50	11/01/2017 22:26	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	90.1			70.0-130		11/01/2017 22:26	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	77.4			70.0-130		11/01/2017 22:26	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	25.1		7.10	20.0	1	11/04/2017 04:08	<a href="#">WG1037727</a>
(S) o-Terphenyl	111			40.0-140		11/04/2017 04:08	<a href="#">WG1037727</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	85.8		1	11/03/2017 16:55	<a href="#">WG1038722</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		2.01	6.05	60.5	11/01/2017 22:59	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		2.01	6.05	60.5	11/01/2017 22:59	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	2.24	<u>B J</u>	2.01	6.05	60.5	11/01/2017 22:59	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		2.01	6.05	60.5	11/01/2017 22:59	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		2.01	6.05	60.5	11/01/2017 22:59	<a href="#">WG1037695</a>
Total VPH	U		4.04	12.1	60.5	11/01/2017 22:59	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	92.3			70.0-130		11/01/2017 22:59	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	80.4			70.0-130		11/01/2017 22:59	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	10.3	<u>J</u>	7.10	20.0	1	11/04/2017 04:22	<a href="#">WG1037727</a>
(S) o-Terphenyl	112			40.0-140		11/04/2017 04:22	<a href="#">WG1037727</a>



## Calculated Results

Analyte	Result	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Sodium Adsorption Ratio	0.204		1	11/02/2017 10:56	WG1037861

<sup>1</sup> Cp

## Total Solids by Method 2540 G-2011

Analyte	Result	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	87.5	%	1	11/03/2017 16:55	<a href="#">WG1038722</a>

<sup>2</sup> Tc<sup>3</sup> Ss

## Wet Chemistry by Method 9045D

Analyte	Result	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
pH	6.26	T8	1	11/07/2017 13:32	<a href="#">WG1039705</a>

<sup>4</sup> Cn

## Sample Narrative:

L947437-13 WG1039705: 6.26 at 19.8C

<sup>5</sup> Sr

## Wet Chemistry by Method 9050AMod

Analyte	Result	<u>Qualifier</u>	RDL	Dilution	Analysis date / time	<u>Batch</u>
Specific Conductance	umhos/cm		umhos/cm			

<sup>6</sup> Qc

## Wet Chemistry by Method 9056A

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
Sulfate	mg/kg		mg/kg	mg/kg			

<sup>7</sup> GI

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/01/2017 23:32	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/01/2017 23:32	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	U		1.66	5.00	50	11/01/2017 23:32	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/01/2017 23:32	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/01/2017 23:32	<a href="#">WG1037695</a>
Total VPH	U		3.34	10.0	50	11/01/2017 23:32	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	95.1			70.0-130		11/01/2017 23:32	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	82.6			70.0-130		11/01/2017 23:32	<a href="#">WG1037695</a>

<sup>8</sup> Al<sup>9</sup> Sc

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	mg/kg		mg/kg	mg/kg			
(S) o-Terphenyl	102	T8	7.10	20.0	1	11/04/2017 04:37	<a href="#">WG1037727</a>

## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
Anthracene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>
Acenaphthene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>
Acenaphthylene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>
Benzo(a)anthracene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>
Benzo(a)pyrene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>
Benzo(b)fluoranthene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>



## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch	
Benzo(g,h,i)perylene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>	<sup>1</sup> Cp
Benzo(k)fluoranthene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>	<sup>2</sup> Tc
Chrysene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>	<sup>3</sup> Ss
Dibenz(a,h)anthracene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>	<sup>4</sup> Cn
Fluoranthene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>	<sup>5</sup> Sr
Fluorene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>	<sup>6</sup> Qc
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>	<sup>7</sup> Gl
Naphthalene	U		0.00200	0.0200	1	11/07/2017 10:05	<a href="#">WG1039404</a>	<sup>8</sup> Al
Phenanthrene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>	<sup>9</sup> Sc
Pyrene	U		0.000600	0.00600	1	11/07/2017 10:05	<a href="#">WG1039404</a>	
1-Methylnaphthalene	U		0.00200	0.0200	1	11/07/2017 10:05	<a href="#">WG1039404</a>	
2-Methylnaphthalene	U		0.00200	0.0200	1	11/07/2017 10:05	<a href="#">WG1039404</a>	
2-Chloronaphthalene	U		0.00200	0.0200	1	11/07/2017 10:05	<a href="#">WG1039404</a>	
(S) p-Terphenyl-d14	63.4			23.0-120		11/07/2017 10:05	<a href="#">WG1039404</a>	
(S) Nitrobenzene-d5	56.2			14.0-149		11/07/2017 10:05	<a href="#">WG1039404</a>	
(S) 2-Fluorobiphenyl	65.3			34.0-125		11/07/2017 10:05	<a href="#">WG1039404</a>	



## Preparation by Method 1311

Analyte	<u>Result</u>	<u>Qualifier</u>	Prep date / time	<u>Batch</u>	<sup>1</sup> Cp
TCLP Extraction	-		11/2/2017 12:24:52 PM	WG1038342	
Fluid	1		11/2/2017 12:24:52 PM	WG1038342	
Initial pH	6.71		11/2/2017 12:24:52 PM	WG1038342	
Final pH	4.83		11/2/2017 12:24:52 PM	WG1038342	

## Mercury by Method 7470A

Analyte	<u>Result</u>	<u>Qualifier</u>	RDL	Limit	Dilution	Analysis date / time	<u>Batch</u>	<sup>2</sup> Tc
	mg/l		mg/l	mg/l				<sup>3</sup> Ss
Mercury	ND		0.0100	0.20	1	11/03/2017 14:54	<a href="#">WG1038736</a>	<sup>4</sup> Cn

## Metals (ICP) by Method 6010B

Analyte	<u>Result</u>	<u>Qualifier</u>	RDL	Limit	Dilution	Analysis date / time	<u>Batch</u>	<sup>5</sup> Sr
	mg/l		mg/l	mg/l				<sup>6</sup> Qc
Arsenic	ND		0.100	5	1	11/03/2017 14:51	<a href="#">WG1038702</a>	<sup>7</sup> Gl
Barium	0.490		0.100	100	1	11/03/2017 14:51	<a href="#">WG1038702</a>	
Cadmium	ND		0.100	1	1	11/03/2017 14:51	<a href="#">WG1038702</a>	
Chromium	ND		0.100	5	1	11/03/2017 14:51	<a href="#">WG1038702</a>	
Lead	ND		0.100	5	1	11/03/2017 14:51	<a href="#">WG1038702</a>	<sup>8</sup> Al
Nickel	ND		0.100		1	11/03/2017 14:51	<a href="#">WG1038702</a>	
Selenium	ND		0.100	1	1	11/03/2017 14:51	<a href="#">WG1038702</a>	
Silver	ND		0.100	5	1	11/03/2017 14:51	<a href="#">WG1038702</a>	<sup>9</sup> Sc



## Calculated Results

Analyte	Result	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Sodium Adsorption Ratio	1.03		1	11/02/2017 11:05	WG1037861

<sup>1</sup> Cp

## Total Solids by Method 2540 G-2011

Analyte	Result	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	82.8	%	1	11/03/2017 16:55	<a href="#">WG1038722</a>

<sup>2</sup> Tc<sup>3</sup> Ss

## Wet Chemistry by Method 9045D

Analyte	Result	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
pH	6.52	T8	1	11/07/2017 13:32	<a href="#">WG1039705</a>

<sup>4</sup> Cn

## Sample Narrative:

L947437-15 WG1039705: 6.52 at 19.8C

<sup>5</sup> Sr

## Wet Chemistry by Method 9050AMod

Analyte	Result	<u>Qualifier</u>	RDL	Dilution	Analysis date / time	<u>Batch</u>
Specific Conductance	umhos/cm		umhos/cm			

<sup>6</sup> Qc

## Wet Chemistry by Method 9056A

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
Sulfate	mg/kg		mg/kg	mg/kg			

<sup>7</sup> GI

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/02/2017 00:04	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/02/2017 00:04	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	1.71	B, J	1.66	5.00	50	11/02/2017 00:04	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/02/2017 00:04	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/02/2017 00:04	<a href="#">WG1037695</a>
Total VPH	U		3.34	10.0	50	11/02/2017 00:04	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	95.8			70.0-130		11/02/2017 00:04	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	82.0			70.0-130		11/02/2017 00:04	<a href="#">WG1037695</a>

<sup>8</sup> Al<sup>9</sup> Sc

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	mg/kg		mg/kg	mg/kg			
(S) o-Terphenyl	71.7	T8	7.10	20.0	1	11/04/2017 04:51	<a href="#">WG1037727</a>

## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
Anthracene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>
Acenaphthene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>
Acenaphthylene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>
Benzo(a)anthracene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>
Benzo(a)pyrene	0.00212	J	0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>
Benzo(b)fluoranthene	0.00162	J	0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>



## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch	
Benzo(g,h,i)perylene	0.00324	J	0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>	<sup>1</sup> Cp
Benzo(k)fluoranthene	0.00378	J	0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>	<sup>2</sup> Tc
Chrysene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>	<sup>3</sup> Ss
Dibenz(a,h)anthracene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>	<sup>4</sup> Cn
Fluoranthene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>	<sup>5</sup> Sr
Fluorene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>	<sup>6</sup> Qc
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>	<sup>7</sup> Gl
Naphthalene	U		0.00200	0.0200	1	11/07/2017 10:27	<a href="#">WG1039404</a>	<sup>8</sup> Al
Phenanthrene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>	<sup>9</sup> Sc
Pyrene	U		0.000600	0.00600	1	11/07/2017 10:27	<a href="#">WG1039404</a>	
1-Methylnaphthalene	U		0.00200	0.0200	1	11/07/2017 10:27	<a href="#">WG1039404</a>	
2-Methylnaphthalene	U		0.00200	0.0200	1	11/07/2017 10:27	<a href="#">WG1039404</a>	
2-Chloronaphthalene	U		0.00200	0.0200	1	11/07/2017 10:27	<a href="#">WG1039404</a>	
(S) p-Terphenyl-d14	69.6			23.0-120		11/07/2017 10:27	<a href="#">WG1039404</a>	
(S) Nitrobenzene-d5	60.6			14.0-149		11/07/2017 10:27	<a href="#">WG1039404</a>	
(S) 2-Fluorobiphenyl	67.7			34.0-125		11/07/2017 10:27	<a href="#">WG1039404</a>	



## Preparation by Method 1311

Analyte	<u>Result</u>	<u>Qualifier</u>	Prep date / time	<u>Batch</u>	<sup>1</sup> Cp
TCLP Extraction	-		11/2/2017 12:24:52 PM	WG1038342	
Fluid	1		11/2/2017 12:24:52 PM	WG1038342	
Initial pH	7.51		11/2/2017 12:24:52 PM	WG1038342	
Final pH	4.99		11/2/2017 12:24:52 PM	WG1038342	

## Mercury by Method 7470A

Analyte	<u>Result</u>	<u>Qualifier</u>	RDL	Limit	Dilution	Analysis date / time	<u>Batch</u>	<sup>2</sup> Tc
Mercury	ND		0.0100	0.20	1	11/03/2017 14:57	<a href="#">WG1038736</a>	

## Metals (ICP) by Method 6010B

Analyte	<u>Result</u>	<u>Qualifier</u>	RDL	Limit	Dilution	Analysis date / time	<u>Batch</u>	<sup>3</sup> Ss
Arsenic	ND		0.100	5	1	11/03/2017 14:54	<a href="#">WG1038702</a>	
Barium	0.680		0.100	100	1	11/03/2017 14:54	<a href="#">WG1038702</a>	
Cadmium	ND		0.100	1	1	11/03/2017 14:54	<a href="#">WG1038702</a>	
Chromium	ND		0.100	5	1	11/03/2017 14:54	<a href="#">WG1038702</a>	
Lead	ND		0.100	5	1	11/03/2017 14:54	<a href="#">WG1038702</a>	
Nickel	ND		0.100		1	11/03/2017 14:54	<a href="#">WG1038702</a>	
Selenium	ND		0.100	1	1	11/03/2017 14:54	<a href="#">WG1038702</a>	
Silver	ND		0.100	5	1	11/03/2017 14:54	<a href="#">WG1038702</a>	

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	84.4		1	11/03/2017 17:37	<a href="#">WG1038724</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		2.20	6.60	66	11/02/2017 00:37	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		2.20	6.60	66	11/02/2017 00:37	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	2.49	<u>B J</u>	2.20	6.60	66	11/02/2017 00:37	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		2.20	6.60	66	11/02/2017 00:37	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		2.20	6.60	66	11/02/2017 00:37	<a href="#">WG1037695</a>
Total VPH	U		4.40	13.2	66	11/02/2017 00:37	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	90.9			70.0-130		11/02/2017 00:37	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	78.1			70.0-130		11/02/2017 00:37	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	11.9	<u>J T8</u>	7.10	20.0	1	11/04/2017 05:06	<a href="#">WG1037727</a>
(S) o-Terphenyl	102			40.0-140		11/04/2017 05:06	<a href="#">WG1037727</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	85.6		1	11/03/2017 17:37	<a href="#">WG1038724</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		2.06	6.20	62	11/02/2017 01:10	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		2.06	6.20	62	11/02/2017 01:10	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	2.32	<u>B J</u>	2.06	6.20	62	11/02/2017 01:10	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		2.06	6.20	62	11/02/2017 01:10	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		2.06	6.20	62	11/02/2017 01:10	<a href="#">WG1037695</a>
Total VPH	U		4.14	12.4	62	11/02/2017 01:10	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	93.7			70.0-130		11/02/2017 01:10	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	80.2			70.0-130		11/02/2017 01:10	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	8.58	<u>J T8</u>	7.10	20.0	1	11/04/2017 05:20	<a href="#">WG1037727</a>
(S) o-Terphenyl	82.4			40.0-140		11/04/2017 05:20	<a href="#">WG1037727</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	75.5		1	11/03/2017 17:37	<a href="#">WG1038724</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		2.06	6.20	62	11/02/2017 01:42	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		2.06	6.20	62	11/02/2017 01:42	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	2.71	<u>B J</u>	2.06	6.20	62	11/02/2017 01:42	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		2.06	6.20	62	11/02/2017 01:42	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		2.06	6.20	62	11/02/2017 01:42	<a href="#">WG1037695</a>
Total VPH	U		4.14	12.4	62	11/02/2017 01:42	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	94.4			70.0-130		11/02/2017 01:42	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	80.9			70.0-130		11/02/2017 01:42	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	11.0	<u>J</u>	7.10	20.0	1	11/04/2017 05:35	<a href="#">WG1037727</a>
(S) o-Terphenyl	107			40.0-140		11/04/2017 05:35	<a href="#">WG1037727</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	80.0		1	11/03/2017 17:37	<a href="#">WG1038724</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.91	5.75	57.5	11/02/2017 02:15	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	23.5		1.91	5.75	57.5	11/02/2017 02:15	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	14.2	<u>B</u>	1.91	5.75	57.5	11/02/2017 02:15	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.91	5.75	57.5	11/02/2017 02:15	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	23.5		1.91	5.75	57.5	11/02/2017 02:15	<a href="#">WG1037695</a>
Total VPH	37.7		3.84	11.5	57.5	11/02/2017 02:15	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	89.3			70.0-130		11/02/2017 02:15	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	76.7			70.0-130		11/02/2017 02:15	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	56.8	<u>B</u>	7.10	20.0	1	11/03/2017 16:35	<a href="#">WG1037733</a>
(S) o-Terphenyl	118			40.0-140		11/03/2017 16:35	<a href="#">WG1037733</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	88.4		1	11/03/2017 17:37	<a href="#">WG1038724</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/02/2017 02:48	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/02/2017 02:48	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	2.45	<u>B J</u>	1.66	5.00	50	11/02/2017 02:48	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/02/2017 02:48	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/02/2017 02:48	<a href="#">WG1037695</a>
Total VPH	U		3.34	10.0	50	11/02/2017 02:48	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	91.2			70.0-130		11/02/2017 02:48	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	79.7			70.0-130		11/02/2017 02:48	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	385		7.10	20.0	1	11/03/2017 17:20	<a href="#">WG1037733</a>
Unadjusted C9-C18 Aliphatics	41.2		6.67	20.0	1	11/21/2017 09:52	<a href="#">WG1044760</a>
Unadjusted C19-C36 Aliphatics	87.9		6.67	20.0	1	11/21/2017 09:52	<a href="#">WG1044760</a>
Unadjusted C11-C22 Aromatics	118		6.67	20.0	1	11/20/2017 16:12	<a href="#">WG1044760</a>
Unadjusted Total Petroleum Hydrocarbons	247		6.67	20.0	1	11/21/2017 09:52	<a href="#">WG1044760</a>
Adjusted C11-C22 Aromatics	118		6.67	20.0	1	11/20/2017 16:12	<a href="#">WG1044760</a>
Adjusted Total Petroleum Hydrocarbons	247		6.67	20.0	1	11/21/2017 09:52	<a href="#">WG1044760</a>
(S) o-Terphenyl	109			40.0-140		11/03/2017 17:20	<a href="#">WG1037733</a>
(S) o-Terphenyl	76.6			40.0-140		11/20/2017 16:12	<a href="#">WG1044760</a>
(S) 1-Chloro-octadecane	73.8			40.0-140		11/21/2017 09:52	<a href="#">WG1044760</a>
(S) 2-Fluorobiphenyl	92.6			40.0-140		11/20/2017 16:12	<a href="#">WG1044760</a>
(S) 2-Bromonaphthalene	104			40.0-140		11/20/2017 16:12	<a href="#">WG1044760</a>

## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Anthracene	0.00447	<u>J</u>	0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Acenaphthene	0.00439	<u>J</u>	0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Acenaphthylene	0.00137	<u>J</u>	0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Benzo(a)anthracene	0.000975	<u>J</u>	0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Benzo(a)pyrene	U		0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Benzo(b)fluoranthene	U		0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Benzo(g,h,i)perylene	0.00119	<u>J</u>	0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Benzo(k)fluoranthene	U		0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Chrysene	0.00443	<u>J</u>	0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Dibenz(a,h)anthracene	U	<u>J3</u>	0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Fluoranthene	0.00248	<u>J3</u>	0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Fluorene	0.00846		0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Indeno(1,2,3-cd)pyrene	U	<u>J3</u>	0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Naphthalene	0.00489	<u>J</u>	0.00200	0.0200	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Phenanthrene	0.0200		0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
Pyrene	0.00628		0.000600	0.00600	1	11/08/2017 20:59	<a href="#">WG1039976</a>
1-Methylnaphthalene	0.0175	<u>J</u>	0.00200	0.0200	1	11/08/2017 20:59	<a href="#">WG1039976</a>
2-Methylnaphthalene	0.00259	<u>J</u>	0.00200	0.0200	1	11/08/2017 20:59	<a href="#">WG1039976</a>
2-Chloronaphthalene	U		0.00200	0.0200	1	11/08/2017 20:59	<a href="#">WG1039976</a>
(S) p-Terphenyl-d14	62.7			23.0-120		11/08/2017 20:59	<a href="#">WG1039976</a>

I18J19

Collected date/time: 10/25/17 12:20

## SAMPLE RESULTS - 21

L947437

ONE LAB. NATIONWIDE.



## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch	
(S) Nitrobenzene-d5	56.2			14.0-149		11/08/2017 20:59	<a href="#">WG1039976</a>	<sup>1</sup> Cp
(S) 2-Fluorobiphenyl	61.1			34.0-125		11/08/2017 20:59	<a href="#">WG1039976</a>	<sup>2</sup> Tc

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

K17L18

Collected date/time: 10/25/17 14:25

## SAMPLE RESULTS - 22

L947437

ONE LAB. NATIONWIDE.



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	87.5		1	11/03/2017 17:37	<a href="#">WG1038724</a>

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	152		7.10	20.0	1	11/03/2017 17:34	<a href="#">WG1037733</a>
(S) o-Terphenyl	109			40.0-140		11/03/2017 17:34	<a href="#">WG1037733</a>

ACCOUNT:

Absaroka Energy &amp; Environmental - WY

PROJECT:

JBO.MT.0124.01

SDG:

L947437

DATE/TIME:

11/30/17 07:44

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K19L20

Collected date/time: 10/25/17 14:45

## SAMPLE RESULTS - 23

L947437

ONE LAB. NATIONWIDE.



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	76.3		1	11/03/2017 17:37	<a href="#">WG1038724</a>

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	61.5	<a href="#">B</a>	7.10	20.0	1	11/03/2017 17:49	<a href="#">WG1037733</a>
(S) o-Terphenyl	115			40.0-140		11/03/2017 17:49	<a href="#">WG1037733</a>

ACCOUNT:

Absaroka Energy &amp; Environmental - WY

PROJECT:

JBO.MT.0124.01

SDG:

L947437

DATE/TIME:

11/30/17 07:44

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C22D23

Collected date/time: 10/25/17 10:15

## SAMPLE RESULTS - 24

L947437

ONE LAB. NATIONWIDE.



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	85.4		1	11/03/2017 17:37	<a href="#">WG1038724</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.73	5.20	52	11/02/2017 03:53	<a href="#">WG1037695</a>
Unadjusted C9-C12 Aliphatics	U		1.73	5.20	52	11/02/2017 03:53	<a href="#">WG1037695</a>
Unadjusted C9-C10 Aromatics	2.28	<u>B</u> <u>J</u>	1.73	5.20	52	11/02/2017 03:53	<a href="#">WG1037695</a>
Adjusted C5-C8 Aliphatics	U		1.73	5.20	52	11/02/2017 03:53	<a href="#">WG1037695</a>
Adjusted C9-C12 Aliphatics	U		1.73	5.20	52	11/02/2017 03:53	<a href="#">WG1037695</a>
Total VPH	U		3.47	10.4	52	11/02/2017 03:53	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(FID)	95.0			70.0-130		11/02/2017 03:53	<a href="#">WG1037695</a>
(S) 2,5-Dibromotoluene(PID)	83.7			70.0-130		11/02/2017 03:53	<a href="#">WG1037695</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	41.7	<u>B</u>	7.10	20.0	1	11/03/2017 18:04	<a href="#">WG1037733</a>
(S) o-Terphenyl	109			40.0-140		11/03/2017 18:04	<a href="#">WG1037733</a>

ACCOUNT:

Absaroka Energy &amp; Environmental - WY

PROJECT:

JBO.MT.0124.01

SDG:

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DATE/TIME:

11/30/17 07:44

PAGE:

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## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	85.3		1	11/03/2017 17:37	<a href="#">WG1038724</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U	<a href="#">J5</a>	1.66	5.00	50	11/06/2017 18:58	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	U	<a href="#">J5</a>	1.66	5.00	50	11/06/2017 18:58	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	U	<a href="#">J5</a>	1.66	5.00	50	11/06/2017 18:58	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/06/2017 18:58	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	U		1.66	5.00	50	11/06/2017 18:58	<a href="#">WG1037698</a>
Total VPH	U	<a href="#">J5</a>	3.34	10.0	50	11/06/2017 18:58	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	96.8			70.0-130		11/06/2017 18:58	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	98.2			70.0-130		11/06/2017 18:58	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	43.8	<a href="#">B</a>	7.10	20.0	1	11/03/2017 18:19	<a href="#">WG1037733</a>
(S) o-Terphenyl	102			40.0-140		11/03/2017 18:19	<a href="#">WG1037733</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	80.9		1	11/03/2017 17:37	<a href="#">WG1038724</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.93	5.80	58	11/06/2017 19:31	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	4.25	J	1.93	5.80	58	11/06/2017 19:31	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	3.98	J	1.93	5.80	58	11/06/2017 19:31	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		1.93	5.80	58	11/06/2017 19:31	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	4.25	J	1.93	5.80	58	11/06/2017 19:31	<a href="#">WG1037698</a>
Total VPH	8.23	J	3.87	11.6	58	11/06/2017 19:31	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	103			70.0-130		11/06/2017 19:31	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	98.5			70.0-130		11/06/2017 19:31	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	191		7.10	20.0	1	11/03/2017 22:29	<a href="#">WG1037733</a>
(S) o-Terphenyl	115			40.0-140		11/03/2017 22:29	<a href="#">WG1037733</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	86.1		1	11/03/2017 14:15	<a href="#">WG1038727</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.73	5.20	52	11/06/2017 20:03	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	2.38	J	1.73	5.20	52	11/06/2017 20:03	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	2.98	J	1.73	5.20	52	11/06/2017 20:03	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		1.73	5.20	52	11/06/2017 20:03	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	2.38	J	1.73	5.20	52	11/06/2017 20:03	<a href="#">WG1037698</a>
Total VPH	5.36	J	3.47	10.4	52	11/06/2017 20:03	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	99.4			70.0-130		11/06/2017 20:03	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	99.2			70.0-130		11/06/2017 20:03	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	251		7.10	20.0	1	11/03/2017 22:43	<a href="#">WG1037733</a>
Unadjusted C9-C18 Aliphatics	26.0		6.67	20.0	1	11/21/2017 09:32	<a href="#">WG1044760</a>
Unadjusted C19-C36 Aliphatics	61.9		6.67	20.0	1	11/21/2017 09:32	<a href="#">WG1044760</a>
Unadjusted C11-C22 Aromatics	73.2		6.67	20.0	1	11/20/2017 16:32	<a href="#">WG1044760</a>
Unadjusted Total Petroleum Hydrocarbons	161		6.67	20.0	1	11/21/2017 09:32	<a href="#">WG1044760</a>
Adjusted C11-C22 Aromatics	73.2		6.67	20.0	1	11/20/2017 16:32	<a href="#">WG1044760</a>
Adjusted Total Petroleum Hydrocarbons	161		6.67	20.0	1	11/21/2017 09:32	<a href="#">WG1044760</a>
(S) o-Terphenyl	106			40.0-140		11/03/2017 22:43	<a href="#">WG1037733</a>
(S) o-Terphenyl	74.5			40.0-140		11/20/2017 16:32	<a href="#">WG1044760</a>
(S) 1-Chloro-octadecane	70.5			40.0-140		11/21/2017 09:32	<a href="#">WG1044760</a>
(S) 2-Fluorobiphenyl	86.8			40.0-140		11/20/2017 16:32	<a href="#">WG1044760</a>
(S) 2-Bromonaphthalene	97.0			40.0-140		11/20/2017 16:32	<a href="#">WG1044760</a>

## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Anthracene	0.0100		0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Acenaphthene	0.00892		0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Acenaphthylene	0.00291	J	0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Benzo(a)anthracene	0.00192	J	0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Benzo(a)pyrene	0.00132	J	0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Benzo(b)fluoranthene	0.00819		0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Benzo(g,h,i)perylene	0.00247	J	0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Benzo(k)fluoranthene	0.00102	J	0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Chrysene	0.00956		0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Dibenz(a,h)anthracene	0.000851	J J3	0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Fluoranthene	0.00358	J J3	0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Fluorene	0.0183		0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Indeno(1,2,3-cd)pyrene	U	J3	0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Naphthalene	0.00330	J	0.00200	0.0200	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Phenanthrene	0.0398		0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
Pyrene	0.0127		0.000600	0.00600	1	11/07/2017 19:53	<a href="#">WG1039976</a>
1-Methylnaphthalene	0.0335		0.00200	0.0200	1	11/07/2017 19:53	<a href="#">WG1039976</a>
2-Methylnaphthalene	0.0247		0.00200	0.0200	1	11/07/2017 19:53	<a href="#">WG1039976</a>
2-Chloronaphthalene	U		0.00200	0.0200	1	11/07/2017 19:53	<a href="#">WG1039976</a>
(S) p-Terphenyl-d14	85.5			23.0-120		11/07/2017 19:53	<a href="#">WG1039976</a>

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Collected date/time: 10/26/17 11:45

## SAMPLE RESULTS - 27

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## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch	
(S) Nitrobenzene-d5	80.7			14.0-149		11/07/2017 19:53	<a href="#">WG1039976</a>	<sup>1</sup> Cp
(S) 2-Fluorobiphenyl	90.8			34.0-125		11/07/2017 19:53	<a href="#">WG1039976</a>	<sup>2</sup> Tc

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	81.9		1	11/03/2017 14:15	<a href="#">WG1038727</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.85	5.55	55.5	11/06/2017 20:36	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	2.45	J	1.85	5.55	55.5	11/06/2017 20:36	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	U		1.85	5.55	55.5	11/06/2017 20:36	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		1.85	5.55	55.5	11/06/2017 20:36	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	2.45	J	1.85	5.55	55.5	11/06/2017 20:36	<a href="#">WG1037698</a>
Total VPH	U		3.70	11.1	55.5	11/06/2017 20:36	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	98.5			70.0-130		11/06/2017 20:36	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	100			70.0-130		11/06/2017 20:36	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	125		7.10	20.0	1	11/03/2017 22:58	<a href="#">WG1037733</a>
(S) o-Terphenyl	109			40.0-140		11/03/2017 22:58	<a href="#">WG1037733</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	90.0		1	11/03/2017 14:15	<a href="#">WG1038727</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	10.2		1.88	5.65	56.5	11/06/2017 21:09	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	3.02	J	1.88	5.65	56.5	11/06/2017 21:09	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	U		1.88	5.65	56.5	11/06/2017 21:09	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	10.2		1.88	5.65	56.5	11/06/2017 21:09	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	3.02	J	1.88	5.65	56.5	11/06/2017 21:09	<a href="#">WG1037698</a>
Total VPH	13.2		3.77	11.3	56.5	11/06/2017 21:09	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	101			70.0-130		11/06/2017 21:09	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	104			70.0-130		11/06/2017 21:09	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	33.5	B	7.10	20.0	1	11/03/2017 23:13	<a href="#">WG1037733</a>
(S) o-Terphenyl	99.8			40.0-140		11/03/2017 23:13	<a href="#">WG1037733</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	86.0		1	11/03/2017 14:15	<a href="#">WG1038727</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	2.25	J	1.66	5.00	50	11/06/2017 21:41	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	11.5		1.66	5.00	50	11/06/2017 21:41	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	9.02		1.66	5.00	50	11/06/2017 21:41	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	2.25	J	1.66	5.00	50	11/06/2017 21:41	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	11.5		1.66	5.00	50	11/06/2017 21:41	<a href="#">WG1037698</a>
Total VPH	22.8		3.34	10.0	50	11/06/2017 21:41	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	126			70.0-130		11/06/2017 21:41	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	91.1			70.0-130		11/06/2017 21:41	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	2590		35.5	100	5	11/04/2017 00:40	<a href="#">WG1037733</a>
Unadjusted C9-C18 Aliphatics	591		33.4	100	5	11/21/2017 10:13	<a href="#">WG1044760</a>
Unadjusted C19-C36 Aliphatics	1210		33.4	100	5	11/21/2017 10:13	<a href="#">WG1044760</a>
Unadjusted C11-C22 Aromatics	1520		133	400	20	11/22/2017 15:34	<a href="#">WG1044760</a>
Unadjusted Total Petroleum Hydrocarbons	3320		133	400	20	11/22/2017 15:34	<a href="#">WG1044760</a>
Adjusted C11-C22 Aromatics	1520		133	400	20	11/22/2017 15:34	<a href="#">WG1044760</a>
Adjusted Total Petroleum Hydrocarbons	3320		133	400	20	11/22/2017 15:34	<a href="#">WG1044760</a>
(S) o-Terphenyl	75.0			40.0-140		11/04/2017 00:40	<a href="#">WG1037733</a>
(S) o-Terphenyl	78.8	J		40.0-140		11/22/2017 15:34	<a href="#">WG1044760</a>
(S) 1-Chloro-octadecane	73.0			40.0-140		11/21/2017 10:13	<a href="#">WG1044760</a>
(S) 2-Fluorobiphenyl	96.0	J		40.0-140		11/22/2017 15:34	<a href="#">WG1044760</a>
(S) 2-Bromonaphthalene	117	J		40.0-140		11/22/2017 15:34	<a href="#">WG1044760</a>

## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Anthracene	0.107		0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Acenaphthene	0.133		0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Acenaphthylene	0.0297	J	0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Benzo(a)anthracene	0.0166	J	0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Benzo(a)pyrene	0.0146	J	0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Benzo(b)fluoranthene	0.0357	J	0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Benzo(g,h,i)perylene	0.0212	J	0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Benzo(k)fluoranthene	0.0109	J	0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Chrysene	0.0789		0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Dibenz(a,h)anthracene	0.00793	J J3	0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Fluoranthene	0.0390	J J3	0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Fluorene	0.176		0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Indeno(1,2,3-cd)pyrene	U	J3	0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Naphthalene	0.0402	J	0.0200	0.200	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Phenanthrene	0.468		0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
Pyrene	0.116		0.00600	0.0600	10	11/07/2017 20:37	<a href="#">WG1039976</a>
1-Methylnaphthalene	0.253		0.0200	0.200	10	11/07/2017 20:37	<a href="#">WG1039976</a>
2-Methylnaphthalene	0.219		0.0200	0.200	10	11/07/2017 20:37	<a href="#">WG1039976</a>
2-Chloronaphthalene	U		0.0200	0.200	10	11/07/2017 20:37	<a href="#">WG1039976</a>
(S) p-Terphenyl-d14	104			23.0-120		11/07/2017 20:37	<a href="#">WG1039976</a>

G20H21

Collected date/time: 10/25/17 12:45

## SAMPLE RESULTS - 31

L947437

ONE LAB. NATIONWIDE.



## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) Nitrobenzene-d5	67.6			14.0-149		11/07/2017 20:37	<a href="#">WG1039976</a>
(S) 2-Fluorobiphenyl	85.7			34.0-125		11/07/2017 20:37	<a href="#">WG1039976</a>

## Sample Narrative:

L947437-31 WG1039976: Dilution due to matrix

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

ACCOUNT:

Absaroka Energy &amp; Environmental - WY

PROJECT:

JBO.MT.0124.01

SDG:

L947437

DATE/TIME:

11/30/17 07:44

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## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	84.8		1	11/03/2017 14:15	<a href="#">WG1038727</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/06/2017 22:14	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	2.43	J	1.66	5.00	50	11/06/2017 22:14	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	2.99	J	1.66	5.00	50	11/06/2017 22:14	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		1.66	5.00	50	11/06/2017 22:14	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	2.43	J	1.66	5.00	50	11/06/2017 22:14	<a href="#">WG1037698</a>
Total VPH	5.42	J	3.34	10.0	50	11/06/2017 22:14	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	98.5			70.0-130		11/06/2017 22:14	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	95.7			70.0-130		11/06/2017 22:14	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	562		7.10	20.0	1	11/03/2017 23:42	<a href="#">WG1037733</a>
Unadjusted C9-C18 Aliphatics	60.8		6.67	20.0	1	11/20/2017 15:30	<a href="#">WG1044760</a>
Unadjusted C19-C36 Aliphatics	130		6.67	20.0	1	11/20/2017 15:30	<a href="#">WG1044760</a>
Unadjusted C11-C22 Aromatics	145		6.67	20.0	1	11/20/2017 15:51	<a href="#">WG1044760</a>
Unadjusted Total Petroleum Hydrocarbons	336		6.67	20.0	1	11/20/2017 15:51	<a href="#">WG1044760</a>
Adjusted C11-C22 Aromatics	145		6.67	20.0	1	11/20/2017 15:51	<a href="#">WG1044760</a>
Adjusted Total Petroleum Hydrocarbons	336		6.67	20.0	1	11/20/2017 15:51	<a href="#">WG1044760</a>
(S) o-Terphenyl	88.6			40.0-140		11/03/2017 23:42	<a href="#">WG1037733</a>
(S) o-Terphenyl	61.8			40.0-140		11/20/2017 15:51	<a href="#">WG1044760</a>
(S) 1-Chloro-octadecane	59.6			40.0-140		11/20/2017 15:30	<a href="#">WG1044760</a>
(S) 2-Fluorobiphenyl	77.8			40.0-140		11/20/2017 15:51	<a href="#">WG1044760</a>
(S) 2-Bromonaphthalene	87.5			40.0-140		11/20/2017 15:51	<a href="#">WG1044760</a>

## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Anthracene	0.00491	J	0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Acenaphthene	0.00494	J	0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Acenaphthylene	0.00141	J	0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Benzo(a)anthracene	0.000991	J	0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Benzo(a)pyrene	U		0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Benzo(b)fluoranthene	0.00138	J	0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Benzo(g,h,i)perylene	0.00150	J	0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Benzo(k)fluoranthene	U		0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Chrysene	0.00467	J	0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Dibenz(a,h)anthracene	U		0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Fluoranthene	0.00175	J	0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Fluorene	0.00910		0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Naphthalene	U		0.00200	0.0200	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Phenanthrene	0.0217		0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
Pyrene	0.00604		0.000600	0.00600	1	11/09/2017 11:54	<a href="#">WG1040582</a>
1-Methylnaphthalene	0.0123	J	0.00200	0.0200	1	11/09/2017 11:54	<a href="#">WG1040582</a>
2-Methylnaphthalene	0.00365	J	0.00200	0.0200	1	11/09/2017 11:54	<a href="#">WG1040582</a>
2-Chloronaphthalene	U		0.00200	0.0200	1	11/09/2017 11:54	<a href="#">WG1040582</a>
(S) p-Terphenyl-d14	82.3			23.0-120		11/09/2017 11:54	<a href="#">WG1040582</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

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## SAMPLE RESULTS - 32

L947437

ONE LAB. NATIONWIDE.



## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch	
(S) Nitrobenzene-d5	89.9			14.0-149		11/09/2017 11:54	<a href="#">WG1040582</a>	<sup>1</sup> Cp
(S) 2-Fluorobiphenyl	90.5			34.0-125		11/09/2017 11:54	<a href="#">WG1040582</a>	<sup>2</sup> Tc

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

ACCOUNT:

Absaroka Energy &amp; Environmental - WY

PROJECT:

JBO.MT.0124.01

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## SAMPLE RESULTS - 33

L947437

ONE LAB. NATIONWIDE.



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	85.3		1	11/03/2017 14:15	<a href="#">WG1038727</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		2.45	7.35	73.5	11/06/2017 22:47	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	U		2.45	7.35	73.5	11/06/2017 22:47	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	2.75	J	2.45	7.35	73.5	11/06/2017 22:47	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		2.45	7.35	73.5	11/06/2017 22:47	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	U		2.45	7.35	73.5	11/06/2017 22:47	<a href="#">WG1037698</a>
Total VPH	U		4.90	14.7	73.5	11/06/2017 22:47	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	102			70.0-130		11/06/2017 22:47	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	105			70.0-130		11/06/2017 22:47	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	118		7.10	20.0	1	11/03/2017 23:56	<a href="#">WG1037733</a>
(S) o-Terphenyl	92.8			40.0-140		11/03/2017 23:56	<a href="#">WG1037733</a>

ACCOUNT:

Absaroka Energy &amp; Environmental - WY

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## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	61.8		1	11/03/2017 14:15	<a href="#">WG1038727</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.78	5.35	53.5	11/06/2017 23:20	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	U		1.78	5.35	53.5	11/06/2017 23:20	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	U		1.78	5.35	53.5	11/06/2017 23:20	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		1.78	5.35	53.5	11/06/2017 23:20	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	U		1.78	5.35	53.5	11/06/2017 23:20	<a href="#">WG1037698</a>
Total VPH	U		3.57	10.7	53.5	11/06/2017 23:20	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	101			70.0-130		11/06/2017 23:20	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	104			70.0-130		11/06/2017 23:20	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	57.7	<u>B</u>	7.10	20.0	1	11/04/2017 00:11	<a href="#">WG1037733</a>
(S) o-Terphenyl	92.4			40.0-140		11/04/2017 00:11	<a href="#">WG1037733</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	86.5		1	11/03/2017 14:15	<a href="#">WG1038727</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	2.36	J	1.66	5.00	50	11/06/2017 23:53	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	11.4		1.66	5.00	50	11/06/2017 23:53	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	9.08		1.66	5.00	50	11/06/2017 23:53	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	2.36	J	1.66	5.00	50	11/06/2017 23:53	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	11.4		1.66	5.00	50	11/06/2017 23:53	<a href="#">WG1037698</a>
Total VPH	22.8		3.34	10.0	50	11/06/2017 23:53	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	124			70.0-130		11/06/2017 23:53	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	90.5			70.0-130		11/06/2017 23:53	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	153		7.10	20.0	1	11/04/2017 00:26	<a href="#">WG1037733</a>
(S) o-Terphenyl	110			40.0-140		11/04/2017 00:26	<a href="#">WG1037733</a>



## Calculated Results

Analyte	Result	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Sodium Adsorption Ratio	6.94		1	11/07/2017 10:48	<a href="#">WG1039800</a>

<sup>1</sup> Cp

## Total Solids by Method 2540B

Analyte	Result	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	mg/l				
Total Solids	3720	T8	1	11/01/2017 13:28	<a href="#">WG1037624</a>

<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr

## Wet Chemistry by Method 9040C

Analyte	Result	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
pH	su				
pH	7.75	T8	1	11/06/2017 11:00	<a href="#">WG1038747</a>

<sup>6</sup> Qc<sup>7</sup> GI

## Sample Narrative:

L947437-36 WG1038747: 7.75 at 18.1C

## Wet Chemistry by Method 9050A

Analyte	Result	<u>Qualifier</u>	RDL	Dilution	Analysis date / time	<u>Batch</u>
Specific Conductance	umhos/cm		umhos/cm			
Specific Conductance	2800		10.0	1	11/01/2017 11:57	<a href="#">WG1037573</a>

<sup>8</sup> Al<sup>9</sup> Sc

## Wet Chemistry by Method 9056A

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
Sulfate	mg/l		mg/l	mg/l			
Sulfate	620		1.55	100	20	11/02/2017 20:31	<a href="#">WG1038187</a>

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		0.0333	0.100	1	11/01/2017 03:42	<a href="#">WG1037618</a>
Unadjusted C9-C12 Aliphatics	U		0.0333	0.100	1	11/01/2017 03:42	<a href="#">WG1037618</a>
Unadjusted C9-C10 Aromatics	U		0.0333	0.100	1	11/01/2017 03:42	<a href="#">WG1037618</a>
Adjusted C5-C8 Aliphatics	U		0.0333	0.100	1	11/01/2017 03:42	<a href="#">WG1037618</a>
Adjusted C9-C12 Aliphatics	U		0.0333	0.100	1	11/01/2017 03:42	<a href="#">WG1037618</a>
Total VPH	U		0.0667	0.200	1	11/01/2017 03:42	<a href="#">WG1037618</a>
(S) 2,5-Dibromotoluene(FID)	98.4			70.0-130		11/01/2017 03:42	<a href="#">WG1037618</a>
(S) 2,5-Dibromotoluene(PID)	85.1			70.0-130		11/01/2017 03:42	<a href="#">WG1037618</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	mg/l		mg/l	mg/l			
EPH Screen	1.03	T8	0.100	0.300	1	11/09/2017 02:37	<a href="#">WG1040258</a>
(S) o-Terphenyl	83.1			40.0-140		11/09/2017 02:37	<a href="#">WG1040258</a>

## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result	<u>Qualifier</u>	MDL	RDL	Dilution	Analysis date / time	<u>Batch</u>
Anthracene	U	T8	0.0000140	0.0000500	1	11/03/2017 07:45	<a href="#">WG1038000</a>
Acenaphthene	U	T8	0.0000100	0.0000500	1	11/03/2017 07:45	<a href="#">WG1038000</a>
Acenaphthylene	U	T8	0.0000120	0.0000500	1	11/03/2017 07:45	<a href="#">WG1038000</a>
Benz(a)anthracene	U	T8	0.00000410	0.0000500	1	11/03/2017 07:45	<a href="#">WG1038000</a>
Benzo(a)pyrene	U	T8	0.0000116	0.0000500	1	11/03/2017 07:45	<a href="#">WG1038000</a>
Benzo(b)fluoranthene	U	T8	0.00000212	0.0000500	1	11/03/2017 07:45	<a href="#">WG1038000</a>



## Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch	
Benzo(g,h,i)perylene	U	T <sub>8</sub>	0.00000227	0.0000500	1	11/03/2017 07:45	WG1038000	<sup>1</sup> Cp
Benzo(k)fluoranthene	U	T <sub>8</sub>	0.0000136	0.0000500	1	11/03/2017 07:45	WG1038000	<sup>2</sup> Tc
Chrysene	U	T <sub>8</sub>	0.0000108	0.0000500	1	11/03/2017 07:45	WG1038000	<sup>3</sup> Ss
Dibenz(a,h)anthracene	U	T <sub>8</sub>	0.00000396	0.0000500	1	11/03/2017 07:45	WG1038000	<sup>4</sup> Cn
Fluoranthene	U	T <sub>8</sub>	0.0000157	0.0000500	1	11/03/2017 07:45	WG1038000	<sup>5</sup> Sr
Fluorene	0.0000140	J T <sub>8</sub>	0.00000850	0.0000500	1	11/03/2017 07:45	WG1038000	<sup>6</sup> Qc
Indeno(1,2,3-cd)pyrene	U	T <sub>8</sub>	0.0000148	0.0000500	1	11/03/2017 07:45	WG1038000	<sup>7</sup> Gl
Naphthalene	U	T <sub>8</sub>	0.0000198	0.000250	1	11/03/2017 07:45	WG1038000	<sup>8</sup> Al
Phenanthrene	U	T <sub>8</sub>	0.00000820	0.0000500	1	11/03/2017 07:45	WG1038000	<sup>9</sup> Sc
Pyrene	U	T <sub>8</sub>	0.0000117	0.0000500	1	11/03/2017 07:45	WG1038000	
1-Methylnaphthalene	U	T <sub>8</sub>	0.00000821	0.000250	1	11/03/2017 07:45	WG1038000	
2-Methylnaphthalene	U	T <sub>8</sub>	0.00000902	0.000250	1	11/03/2017 07:45	WG1038000	
2-Chloronaphthalene	U	T <sub>8</sub>	0.00000647	0.000250	1	11/03/2017 07:45	WG1038000	
(S) Nitrobenzene-d <sub>5</sub>	87.0		31.0-160			11/03/2017 07:45	WG1038000	
(S) 2-Fluorobiphenyl	92.6		48.0-148			11/03/2017 07:45	WG1038000	
(S) p-Terphenyl-d <sub>14</sub>	95.0		37.0-146			11/03/2017 07:45	WG1038000	



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	69.3		1	11/03/2017 14:15	<a href="#">WG1038727</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.86	5.60	56	11/07/2017 00:25	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	U		1.86	5.60	56	11/07/2017 00:25	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	2.53	J	1.86	5.60	56	11/07/2017 00:25	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		1.86	5.60	56	11/07/2017 00:25	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	U		1.86	5.60	56	11/07/2017 00:25	<a href="#">WG1037698</a>
Total VPH	U		3.74	11.2	56	11/07/2017 00:25	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	99.9			70.0-130		11/07/2017 00:25	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	99.8			70.0-130		11/07/2017 00:25	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	60.7	T8	7.10	20.0	1	11/07/2017 01:10	<a href="#">WG1038383</a>
(S) o-Terphenyl	91.2			40.0-140		11/07/2017 01:10	<a href="#">WG1038383</a>



## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	88.2		1	11/03/2017 14:15	<a href="#">WG1038727</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.83	5.50	55	11/07/2017 00:58	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	1.84	J	1.83	5.50	55	11/07/2017 00:58	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	U		1.83	5.50	55	11/07/2017 00:58	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		1.83	5.50	55	11/07/2017 00:58	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	1.84	J	1.83	5.50	55	11/07/2017 00:58	<a href="#">WG1037698</a>
Total VPH	U		3.67	11.0	55	11/07/2017 00:58	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	96.8			70.0-130		11/07/2017 00:58	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	100			70.0-130		11/07/2017 00:58	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	23.6	T8	7.10	20.0	1	11/07/2017 01:27	<a href="#">WG1038383</a>
(S) o-Terphenyl	82.5			40.0-140		11/07/2017 01:27	<a href="#">WG1038383</a>

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## SAMPLE RESULTS - 39

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## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	89.4		1	11/03/2017 15:57	<a href="#">WG1038730</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		2.23	6.70	67	11/07/2017 01:31	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	U		2.23	6.70	67	11/07/2017 01:31	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	U		2.23	6.70	67	11/07/2017 01:31	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		2.23	6.70	67	11/07/2017 01:31	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	U		2.23	6.70	67	11/07/2017 01:31	<a href="#">WG1037698</a>
Total VPH	U		4.47	13.4	67	11/07/2017 01:31	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	94.2			70.0-130		11/07/2017 01:31	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	98.0			70.0-130		11/07/2017 01:31	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	40.7		7.10	20.0	1	11/07/2017 02:19	<a href="#">WG1038383</a>
(S) o-Terphenyl	94.2			40.0-140		11/07/2017 02:19	<a href="#">WG1038383</a>

ACCOUNT:

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## SAMPLE RESULTS - 40

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## Total Solids by Method 2540 G-2011

Analyte	Result %	<u>Qualifier</u>	Dilution	Analysis date / time	<u>Batch</u>
Total Solids	83.6		1	11/03/2017 15:57	<a href="#">WG1038730</a>

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> GI<sup>8</sup> Al<sup>9</sup> Sc

## Volatile Petroleum Hydrocarbons by Method MTDEQ VPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
Unadjusted C5-C8 Aliphatics	U		1.80	5.40	54	11/07/2017 02:04	<a href="#">WG1037698</a>
Unadjusted C9-C12 Aliphatics	U		1.80	5.40	54	11/07/2017 02:04	<a href="#">WG1037698</a>
Unadjusted C9-C10 Aromatics	U		1.80	5.40	54	11/07/2017 02:04	<a href="#">WG1037698</a>
Adjusted C5-C8 Aliphatics	U		1.80	5.40	54	11/07/2017 02:04	<a href="#">WG1037698</a>
Adjusted C9-C12 Aliphatics	U		1.80	5.40	54	11/07/2017 02:04	<a href="#">WG1037698</a>
Total VPH	U		3.60	10.8	54	11/07/2017 02:04	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(FID)	97.2			70.0-130		11/07/2017 02:04	<a href="#">WG1037698</a>
(S) 2,5-Dibromotoluene(PID)	101			70.0-130		11/07/2017 02:04	<a href="#">WG1037698</a>

## Semi-Volatile Organic Compounds (GC) by Method MTDEQ EPH

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
EPH Screen	38.5		7.10	20.0	1	11/07/2017 02:36	<a href="#">WG1038383</a>
(S) o-Terphenyl	82.0			40.0-140		11/07/2017 02:36	<a href="#">WG1038383</a>

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## Method Blank (MB)

(MB) R3263095-1 11/03/17 17:20

Analyte	MB Result %	<u>MB Qualifier</u>	MB MDL %	MB RDL %
Total Solids	0.0011			

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947425-02 Original Sample (OS) • Duplicate (DUP)

(OS) L947425-02 11/03/17 17:20 • (DUP) R3263095-3 11/03/17 17:20

Analyte	Original Result %	DUP Result %	Dilution %	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Total Solids	81.3	77.8	1	4		5

## Laboratory Control Sample (LCS)

(LCS) R3263095-2 11/03/17 17:20

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Total Solids	50.0	50.0	100	85-115	

<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc



## Method Blank (MB)

(MB) R3263075-1 11/03/17 16:55

Analyte	MB Result %	<u>MB Qualifier</u>	MB MDL %	MB RDL %
Total Solids	0.0017			

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947437-03 Original Sample (OS) • Duplicate (DUP)

(OS) L947437-03 11/03/17 16:55 • (DUP) R3263075-3 11/03/17 16:55

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Total Solids	80.9	85.9	1	6	J3	5

## Laboratory Control Sample (LCS)

(LCS) R3263075-2 11/03/17 16:55

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Total Solids	50.0	50.0	100	85-115	

<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

[L947437-17,18,19,20,21,22,23,24,25,26](#)

## Method Blank (MB)

(MB) R3263098-1 11/03/17 17:37

Analyte	MB Result %	<u>MB Qualifier</u>	MB MDL %	MB RDL %
Total Solids	0.001			

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947437-17 Original Sample (OS) • Duplicate (DUP)

(OS) L947437-17 11/03/17 17:37 • (DUP) R3263098-3 11/03/17 17:37

Analyte	Original Result %	DUP Result %	Dilution %	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Total Solids	84.4	85.8	1	2		5

## Laboratory Control Sample (LCS)

(LCS) R3263098-2 11/03/17 17:37

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Total Solids	50.0	50.0	100	85-115	

<sup>9</sup>Sc

L947437-27,29,30,31,32,33,34,35,37,38

## Method Blank (MB)

(MB) R3263091-1 11/03/17 14:15

Analyte	MB Result %	<u>MB Qualifier</u>	MB MDL %	MB RDL %
Total Solids	0.0012			

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947437-38 Original Sample (OS) • Duplicate (DUP)

(OS) L947437-38 11/03/17 14:15 • (DUP) R3263091-3 11/03/17 14:15

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Total Solids	88.2	87.4	1	1		5

## Laboratory Control Sample (LCS)

(LCS) R3263091-2 11/03/17 14:15

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Total Solids	50.0	50.0	100	85-115	

<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

WG1038730

Total Solids by Method 2540 G-2011

## QUALITY CONTROL SUMMARY

[L947437-39,40](#)

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## Method Blank (MB)

(MB) R3263072-1 11/03/17 15:57

Analyte	MB Result %	<u>MB Qualifier</u>	MB MDL %	MB RDL %
Total Solids	0.0004			

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947442-07 Original Sample (OS) • Duplicate (DUP)

(OS) L947442-07 11/03/17 15:57 • (DUP) R3263072-3 11/03/17 15:57

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Total Solids	83.6	83.5	1	0		5

## Laboratory Control Sample (LCS)

(LCS) R3263072-2 11/03/17 15:57

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Total Solids	50.0	50.0	100	85-115	

<sup>9</sup>Sc

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## Method Blank (MB)

(MB) R3262422-1 11/01/17 13:28

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
Total Solids	0			

<sup>1</sup>Cp

## L947251-02 Original Sample (OS) • Duplicate (DUP)

(OS) L947251-02 11/01/17 13:28 • (DUP) R3262422-4 11/01/17 13:28

Analyte	Original Result mg/l	DUP Result mg/l	Dilution %	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits
Total Solids	1020	1040	1	2.14		5

<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3262422-2 11/01/17 13:28 • (LCSD) R3262422-3 11/01/17 13:28

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Total Solids	9500	9580	9570	101	101	85-115			0.104	5

<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

L947437-36

## L947157-02 Original Sample (OS) • Duplicate (DUP)

(OS) L947157-02 11/06/17 11:00 • (DUP) R3263348-3 11/06/17 11:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
	SU	SU		%		%
pH	7.44	7.38	1	0.810		1

## Sample Narrative:

OS: 7.44 at 18.6C

DUP: 7.38 at 18.6C

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947454-01 Original Sample (OS) • Duplicate (DUP)

(OS) L947454-01 11/06/17 11:00 • (DUP) R3263348-4 11/06/17 11:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
	SU	SU		%		%
pH	7.48	7.56	1	1.06	<u>J3</u>	1

## Sample Narrative:

OS: 7.48 at 18.4C

DUP: 7.56 at 18.4C

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263348-1 11/06/17 11:00 • (LCSD) R3263348-2 11/06/17 11:00

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
	SU	SU	SU	%	%	%			%	%
pH	5.96	5.88	5.87	98.7	98.5	98.3-102			0.170	1

## Sample Narrative:

LCS: 5.88 at 18.8C

LCSD: 5.87 at 18.9C

[L947437-13,15](#)

## L947442-02 Original Sample (OS) • Duplicate (DUP)

(OS) L947442-02 11/07/17 13:32 • (DUP) R3263718-3 11/07/17 13:32

Analyte	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
	SU	SU		%		%
pH	7.63	7.60	1	0.394		1

## Sample Narrative:

OS: 7.63 at 19.3C  
 DUP: 7.6 at 19.4C

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L948723-01 Original Sample (OS) • Duplicate (DUP)

(OS) L948723-01 11/07/17 13:32 • (DUP) R3263718-4 11/07/17 13:32

Analyte	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
	SU	SU		%		%
pH	8.07	8.08	1	0.124		1

## Sample Narrative:

OS: 8.07 at 19.2C  
 DUP: 8.08 at 19.2C

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263718-1 11/07/17 13:32 • (LCSD) R3263718-2 11/07/17 13:32

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
	SU	SU	SU	%	%	%			%	%
pH	5.96	6.03	6.00	101	101	98.3-102			0.499	1

## Sample Narrative:

LCS: 6.03 at 17.9C  
 LCSD: 6 at 17.9C



## Method Blank (MB)

(MB) WG1037573-1 11/01/17 11:57

Analyte	MB Result umhos/cm	<u>MB Qualifier</u>	MB MDL umhos/cm	MB RDL umhos/cm
Specific Conductance	U		10.0	10.0

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947246-01 Original Sample (OS) • Duplicate (DUP)

(OS) L947246-01 11/01/17 11:57 • (DUP) WG1037573-4 11/01/17 11:57

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Specific Conductance	1220	1220	1	0.000		20

## L947501-04 Original Sample (OS) • Duplicate (DUP)

(OS) L947501-04 11/01/17 11:57 • (DUP) WG1037573-5 11/01/17 11:57

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Specific Conductance	477	477	1	0.000		20

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) WG1037573-2 11/01/17 11:57 • (LCSD) WG1037573-3 11/01/17 11:57

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCSD Result umhos/cm	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Specific Conductance	559	558	556	99.8	99.5	85.0-115			0.359	20

[L947437-13,15](#)

## Method Blank (MB)

(MB) WG1039684-1 11/07/17 15:29

Analyte	MB Result	<u>MB Qualifier</u>	MB MDL	MB RDL
	umhos/cm		umhos/cm	umhos/cm
Specific Conductance	U		10.0	10.0

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L948442-01 Original Sample (OS) • Duplicate (DUP)

(OS) L948442-01 11/07/17 15:29 • (DUP) WG1039684-4 11/07/17 15:29

Analyte	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
	umhos/cm	umhos/cm		%		%
Specific Conductance	134	134	1	0.000		20

<sup>1</sup>G1

## L948473-05 Original Sample (OS) • Duplicate (DUP)

(OS) L948473-05 11/07/17 15:29 • (DUP) WG1039684-5 11/07/17 15:29

Analyte	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
	umhos/cm	umhos/cm		%		%
Specific Conductance	1450	1450	1	0.000		20

<sup>2</sup>Al

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) WG1039684-2 11/07/17 15:29 • (LCSD) WG1039684-3 11/07/17 15:29

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
	umhos/cm	umhos/cm	umhos/cm	%	%	%			%	%
Specific Conductance	559	556	556	99.5	99.5	85.0-115			0.000	20

<sup>3</sup>Sc

[L947437-13,15](#)

## Method Blank (MB)

(MB) R3262926-1 11/02/17 21:47

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg
Sulfate	4.49	J	0.57	50.0

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947401-01 Original Sample (OS) • Duplicate (DUP)

(OS) L947401-01 11/02/17 23:29 • (DUP) R3262926-4 11/02/17 23:50

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Sulfate	ND	8.28	1	6	J	15

## L947425-04 Original Sample (OS) • Duplicate (DUP)

(OS) L947425-04 11/03/17 06:39 • (DUP) R3262926-7 11/03/17 06:59

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Sulfate	14.0	11.4	1	21	J P1	15

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3262926-2 11/02/17 22:08 • (LCSD) R3262926-3 11/02/17 22:28

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Sulfate	200	187	189	93	95	80-120			1	15

## L947401-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947401-02 11/03/17 00:10 • (MS) R3262926-5 11/03/17 00:31 • (MSD) R3262926-6 11/03/17 00:51

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Sulfate	589	ND	572	573	96	96	1	80-120			0	15

L947437-36

## Method Blank (MB)

(MB) R3262739-1 11/02/17 17:18

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
Sulfate	0.443	J	0.0774	5.00

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947420-04 Original Sample (OS) • Duplicate (DUP)

(OS) L947420-04 11/02/17 18:49 • (DUP) R3262739-4 11/02/17 18:59

Analyte	Original Result mg/l	DUP Result mg/l	Dilution %	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Sulfate	88.0	87.4	1	1		15

## L947451-04 Original Sample (OS) • Duplicate (DUP)

(OS) L947451-04 11/02/17 21:11 • (DUP) R3262739-7 11/02/17 21:42

Analyte	Original Result mg/l	DUP Result mg/l	Dilution %	DUP RPD %	<u>DUP Qualifier</u>	DUP RPD Limits %
Sulfate	10.9	9.95	1	10		15

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3262739-2 11/02/17 17:28 • (LCSD) R3262739-3 11/02/17 17:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Sulfate	40.0	40.4	40.1	101	100	80-120			1	15

## L947420-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947420-04 11/02/17 18:49 • (MS) R3262739-5 11/02/17 19:09 • (MSD) R3262739-6 11/02/17 19:40

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution %	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Sulfate	50.0	88.0	126	126	75	77	1	80-120	E J6	E J6	1	15

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947451-04 Original Sample (OS) • Matrix Spike (MS)

(OS) L947451-04 11/02/17 21:11 • (MS) R3262739-8 11/02/17 21:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution %	Rec. Limits %	<u>MS Qualifier</u>
Sulfate	50.0	10.9	51.5	81	1	80-120	

[L947437-14,16](#)

## Method Blank (MB)

(MB) R3262973-1 11/03/17 13:38

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.00333	0.0100

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3262973-2 11/03/17 13:41 • (LCSD) R3262973-3 11/03/17 13:44

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Mercury	0.0300	0.0300	0.0314	100	105	80-120			5	20

## L945220-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L945220-01 11/03/17 13:46 • (MS) R3262973-4 11/03/17 13:49 • (MSD) R3262973-5 11/03/17 13:51

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution %	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Mercury	0.0300	ND	0.0313	0.0312	104	104	1	75-125			0	20

[L947437-14,16](#)

## Method Blank (MB)

(MB) R3262968-1 11/03/17 13:26

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.0333	0.100
Barium	U		0.0333	0.100
Cadmium	U		0.0333	0.100
Chromium	U		0.0333	0.100
Lead	U		0.0333	0.100
Nickel	U		0.0333	0.100
Selenium	0.0466	J	0.0333	0.100
Silver	U		0.0333	0.100

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3262968-2 11/03/17 13:29 • (LCSD) R3262968-3 11/03/17 13:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Arsenic	10.0	9.75	9.72	98	97	80-120			0	20
Barium	10.0	10.2	10.2	102	102	80-120			0	20
Cadmium	10.0	9.77	9.74	98	97	80-120			0	20
Chromium	10.0	9.88	9.84	99	98	80-120			0	20
Lead	10.0	9.97	9.90	100	99	80-120			1	20
Nickel	10.0	10.1	10.0	101	100	80-120			0	20
Selenium	10.0	9.84	9.84	98	98	80-120			0	20
Silver	2.00	1.85	1.83	93	92	80-120			1	20

## L947056-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947056-01 11/03/17 13:36 • (MS) R3262968-5 11/03/17 13:42 • (MSD) R3262968-6 11/03/17 13:46

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	MSD Rec. %	Dilution %	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Arsenic	10.0	ND	10.2	10.1	102	101	1	75-125		1	20
Barium	10.0	ND	10.1	10.0	101	100	1	75-125		1	20
Cadmium	10.0	ND	9.98	9.89	100	99	1	75-125		1	20
Chromium	10.0	ND	9.94	9.86	99	99	1	75-125		1	20
Lead	10.0	ND	10.2	10.1	102	101	1	75-125		1	20
Nickel	10.0	ND	10.5	10.4	105	104	1	75-125		1	20
Selenium	10.0	ND	10.3	10.2	103	102	1	75-125		1	20
Silver	2.00	ND	1.89	1.85	94	93	1	75-125		2	20

L947437-36

## Method Blank (MB)

(MB) R3262511-3 10/31/17 23:34

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
Unadjusted C5-C8 Aliphatics	U		0.0333	0.100
Unadjusted C9-C12 Aliphatics	U		0.0333	0.100
Unadjusted C9-C10 Aromatics	0.0356	J	0.0333	0.100
Adjusted C5-C8 Aliphatics	U		0.0333	0.100
Total VPH	U		0.0667	0.200
Adjusted C9-C12 Aliphatics	U		0.0333	0.100
(S) 2,5-Dibromotoluene(FID)	89.4		70.0-130	
(S) 2,5-Dibromotoluene(PID)	77.5		70.0-130	

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3262511-1 10/31/17 21:56 • (LCSD) R3262511-2 10/31/17 22:29

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
Unadjusted C5-C8 Aliphatics	1.20	1.10	1.09	91.4	91.0	70.0-130			0.520	50
Unadjusted C9-C12 Aliphatics	1.40	1.43	1.43	102	102	70.0-130			0.210	50
Unadjusted C9-C10 Aromatics	0.200	0.192	0.189	95.8	94.4	70.0-130			1.48	50
Total VPH	2.80	2.72	2.71	97.2	96.8	70.0-130			0.480	50
(S) 2,5-Dibromotoluene(FID)				95.2	94.1	70.0-130				
(S) 2,5-Dibromotoluene(PID)				82.6	83.1	70.0-130				

## L947494-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947494-01 11/01/17 08:36 • (MS) R3262511-4 11/01/17 09:42 • (MSD) R3262511-5 11/01/17 10:15

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD	RPD Limits
Unadjusted C5-C8 Aliphatics	1.20	U	1.09	0.673	90.9	56.1	1	70.0-130	J6	47.4	50
Unadjusted C9-C12 Aliphatics	1.40	U	1.42	0.841	102	60.1	1	70.0-130	J3 J6	51.5	50
Unadjusted C9-C10 Aromatics	0.200	0.0348	0.206	0.132	85.8	48.7	1	70.0-130	J6	43.9	50
Total VPH	2.80	U	2.72	1.65	97.0	58.8	1	70.0-130	J6	49.1	50
(S) 2,5-Dibromotoluene(FID)				94.3	96.0		70.0-130				
(S) 2,5-Dibromotoluene(PID)				83.5	84.3		70.0-130				



## Method Blank (MB)

(MB) R3263355-3 11/01/17 17:00

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg															
Unadjusted C5-C8 Aliphatics	U		1.67	5.00															<sup>1</sup> Cp
Unadjusted C9-C12 Aliphatics	U		1.67	5.00															<sup>2</sup> Tc
Unadjusted C9-C10 Aromatics	1.87	J	1.67	5.00															<sup>3</sup> Ss
Adjusted C5-C8 Aliphatics	U		1.67	5.00															<sup>4</sup> Cn
Adjusted C9-C12 Aliphatics	U		1.67	5.00															<sup>5</sup> Sr
Total VPH	U		3.34	10.0															<sup>6</sup> Qc
(S) 2,5-Dibromotoluene(FID)	88.1			70.0-130															<sup>7</sup> GI
(S) 2,5-Dibromotoluene(PID)	75.8			70.0-130															<sup>8</sup> AI

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263355-1 11/01/17 14:49 • (LCSD) R3263355-2 11/01/17 15:22

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits									
Unadjusted C5-C8 Aliphatics	1.20	1.06	1.03	88.3	86.2	70.0-130			2.41	50									
Unadjusted C9-C12 Aliphatics	1.40	1.43	1.38	102	98.3	70.0-130			3.64	50									
Unadjusted C9-C10 Aromatics	0.200	0.183	0.194	91.6	97.2	70.0-130			5.96	50									
Total VPH	2.80	2.67	2.60	95.5	93.0	70.0-130			2.62	50									
(S) 2,5-Dibromotoluene(FID)				96.2	94.1	70.0-130													
(S) 2,5-Dibromotoluene(PID)				83.9	80.9	70.0-130													

## L947437-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947437-01 11/01/17 18:05 • (MS) R3263355-4 11/02/17 04:26 • (MSD) R3263355-5 11/02/17 04:59

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD	RPD Limits							
Unadjusted C5-C8 Aliphatics	1.20	U	55.7	55.8	82.9	83.1	56	70.0-130			0.220	50							
Unadjusted C9-C12 Aliphatics	1.40	U	75.4	75.5	96.2	96.3	56	70.0-130			0.130	50							
Unadjusted C9-C10 Aromatics	0.200	2.11	11.1	11.1	80.7	80.1	56	70.0-130			0.570	50							
Total VPH	2.80	U	142	142	90.7	90.8	56	70.0-130			0.140	50							
(S) 2,5-Dibromotoluene(FID)				94.3	95.5		70.0-130												
(S) 2,5-Dibromotoluene(PID)				81.4	82.9		70.0-130												



## Method Blank (MB)

(MB) R3263606-3 11/06/17 14:53

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg	1 Cp
Unadjusted C5-C8 Aliphatics	U		1.67	5.00	
Unadjusted C9-C12 Aliphatics	U		1.67	5.00	
Unadjusted C9-C10 Aromatics	U		1.67	5.00	
Adjusted C5-C8 Aliphatics	U		1.67	5.00	
Adjusted C9-C12 Aliphatics	U		1.67	5.00	
Total VPH	U		3.34	10.0	
(S) 2,5-Dibromotoluene(FID)	93.2			70.0-130	
(S) 2,5-Dibromotoluene(PID)	95.0			70.0-130	

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263606-1 11/06/17 12:42 • (LCSD) R3263606-2 11/06/17 13:14

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Unadjusted C5-C8 Aliphatics	1.20	1.11	1.09	92.5	91.1	70.0-130			1.50	50
Unadjusted C9-C12 Aliphatics	1.40	1.26	1.27	90.3	90.4	70.0-130			0.0791	50
Unadjusted C9-C10 Aromatics	0.200	0.186	0.185	93.0	92.3	70.0-130			0.787	50
Total VPH	2.80	2.56	2.54	91.3	90.5	70.0-130			0.825	50
(S) 2,5-Dibromotoluene(FID)				96.7	97.2	70.0-130				
(S) 2,5-Dibromotoluene(PID)				95.5	94.7	70.0-130				

## L947437-25 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947437-25 11/06/17 18:58 • (MS) R3263606-4 11/07/17 05:20 • (MSD) R3263606-5 11/07/17 05:53

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %	
Unadjusted C5-C8 Aliphatics	1.20	U	92.2	90.3	154	151	50	70.0-130	J5	J5	2.08	50
Unadjusted C9-C12 Aliphatics	1.40	U	136	136	194	194	50	70.0-130	J5	J5	0.0737	50
Unadjusted C9-C10 Aromatics	0.200	U	19.3	19.4	193	194	50	70.0-130	J5	J5	0.723	50
Total VPH	2.80	U	248	246	177	176	50	70.0-130	J5	J5	0.730	50
(S) 2,5-Dibromotoluene(FID)				101	98.5		70.0-130					
(S) 2,5-Dibromotoluene(PID)				88.9	85.0		70.0-130					



## Method Blank (MB)

(MB) R3263040-1 11/03/17 13:40

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg
EPH Screen	U		7.10	20.0
(S) o-Terphenyl	109			40.0-140

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263040-2 11/03/17 13:55 • (LCSD) R3263040-3 11/03/17 14:09

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
EPH Screen	240	256	227	107	94.7	40.0-140			11.8	25
(S) o-Terphenyl			127	118	40.0-140					



## Method Blank (MB)

(MB) R3262798-1 11/03/17 12:57

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg
EPH Screen	10.1	J	7.10	20.0
(S) o-Terphenyl	136		40.0-140	

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3262798-2 11/03/17 13:11 • (LCSD) R3262798-3 11/03/17 13:26

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
EPH Screen	240	267	254	111	106	40.0-140			5.03	25
(S) o-Terphenyl				119	116	40.0-140				

## L947437-20 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947437-20 11/03/17 16:35 • (MS) R3262798-4 11/03/17 16:50 • (MSD) R3262798-5 11/03/17 17:05

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD	RPD Limits
EPH Screen	240	56.8	367	312	129	106	1	40.0-140			16.2	50
(S) o-Terphenyl					118	123		40.0-140				

[L947437-37,38,39,40](#)

## Method Blank (MB)

(MB) R3263741-1 11/06/17 18:33

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg
EPH Screen	U		7.10	20.0
(S) o-Terphenyl	114			40.0-140

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263741-2 11/06/17 18:50 • (LCSD) R3263741-3 11/06/17 19:07

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
EPH Screen	240	208	217	86.8	90.5	40.0-140			4.18	25
(S) o-Terphenyl				98.2	214	40.0-140	J1			

## L947437-38 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947437-38 11/07/17 01:27 • (MS) R3263741-4 11/07/17 01:44 • (MSD) R3263741-5 11/07/17 02:01

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD	RPD Limits
EPH Screen	240	23.6	246	245	92.8	92.4	1	40.0-140			0.440	50
(S) o-Terphenyl					90.9	90.1		40.0-140				



L947437-04

## Method Blank (MB)

(MB) R3264135-1 11/07/17 18:55

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg
Unadjusted C9-C18 Aliphatics	U		6.67	20.0
Unadjusted C19-C36 Aliphatics	U		6.67	20.0
(S) 1-Chloro-octadecane	89.5			40.0-140

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Method Blank (MB)

(MB) R3264135-4 11/07/17 19:57

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg
Unadjusted C11-C22 Aromatics	U		6.67	20.0
(S) o-Terphenyl	82.6			40.0-140
(S) 2-Fluorobiphenyl	72.0			40.0-140
(S) 2-Bromonaphthalene	76.8			40.0-140

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264135-2 11/07/17 19:15 • (LCSD) R3264135-3 11/07/17 19:36

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
Unadjusted C9-C18 Aliphatics	48.0	36.0	35.2	75.1	73.4	40.0-140			2.31	25
Unadjusted C19-C36 Aliphatics	64.0	66.5	67.0	104	105	40.0-140			0.837	25
(S) 1-Chloro-octadecane				87.4	89.5	40.0-140				

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264135-5 11/07/17 20:18 • (LCSD) R3264135-6 11/07/17 20:39

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
Unadjusted C11-C22 Aromatics	136	102	101	75.0	73.9	40.0-140			1.37	25
(S) o-Terphenyl				89.9	88.3	40.0-140				
(S) 2-Fluorobiphenyl				86.3	84.5	40.0-140				
(S) 2-Bromonaphthalene				92.9	91.2	40.0-140				



L947437-04

## L947392-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947392-02 11/07/17 20:59 • (MS) R3264135-7 11/07/17 21:20 • (MSD) R3264135-8 11/07/17 21:41

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Unadjusted C9-C18 Aliphatics	49.3	ND	35.6	33.7	65.0	61.1	1	40.0-140			5.48	50
Unadjusted C19-C36 Aliphatics	65.7	ND	62.4	66.6	91.3	97.6	1	40.0-140			6.51	50
(S) 1-Chloro-octadecane					83.0	86.3		40.0-140				

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## L947392-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947392-02 11/07/17 20:59 • (MS) R3264135-10 11/07/17 22:23 • (MSD) R3264135-9 11/07/17 22:02

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Unadjusted C11-C22 Aromatics	140	ND	94.3	95.3	65.1	65.8	1	40.0-140			1.04	50
(S) o-Terphenyl					78.3	81.0		40.0-140				
(S) 2-Fluorobiphenyl					77.8	76.2		40.0-140				
(S) 2-Bromonaphthalene					81.0	78.4		40.0-140				

[L947437-21,27,31,32](#)

## Method Blank (MB)

(MB) R3267280-1 11/20/17 12:01

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg
Unadjusted C9-C18 Aliphatics	U		6.67	20.0
Unadjusted C19-C36 Aliphatics	U		6.67	20.0
(S) 1-Chloro-octadecane	86.3			40.0-140

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Method Blank (MB)

(MB) R3267280-4 11/20/17 13:04

Analyte	MB Result mg/kg	<u>MB Qualifier</u>	MB MDL mg/kg	MB RDL mg/kg
Unadjusted C11-C22 Aromatics	U		6.67	20.0
(S) o-Terphenyl	87.5			40.0-140
(S) 2-Fluorobiphenyl	88.9			40.0-140
(S) 2-Bromonaphthalene	96.4			40.0-140

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3267280-2 11/20/17 12:22 • (LCSD) R3267280-3 11/20/17 12:43

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
Unadjusted C9-C18 Aliphatics	48.0	37.9	32.5	79.0	67.7	40.0-140			15.5	25
Unadjusted C19-C36 Aliphatics	64.0	59.4	54.9	92.8	85.9	40.0-140			7.76	25
(S) 1-Chloro-octadecane				86.8	74.7	40.0-140				

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3267280-5 11/20/17 13:25 • (LCSD) R3267280-6 11/20/17 13:46

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD	RPD Limits
Unadjusted C11-C22 Aromatics	136	99.7	100	73.3	73.6	40.0-140			0.389	25
(S) o-Terphenyl				88.7	84.9	40.0-140				
(S) 2-Fluorobiphenyl				87.8	85.8	40.0-140				
(S) 2-Bromonaphthalene				93.8	87.7	40.0-140				



## Method Blank (MB)

(MB) R3264255-1 11/09/17 01:45

Analyte	MB Result mg/l	<u>MB Qualifier</u>	MB MDL mg/l	MB RDL mg/l
EPH Screen	U		0.100	0.300
(S) o-Terphenyl	103			40.0-140

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264255-2 11/09/17 02:03 • (LCSD) R3264255-3 11/09/17 02:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
EPH Screen	3.00	2.67	2.71	89.0	90.3	40.0-140			1.47	25
(S) o-Terphenyl				95.6	99.7	40.0-140				

[L947437-36](#)

## Method Blank (MB)

(MB) R3262845-3 11/03/17 00:29

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l	1 Cp
Anthracene	U		0.0000140	0.0000500	
Acenaphthene	U		0.0000100	0.0000500	
Acenaphthylene	U		0.0000120	0.0000500	
Benzo(a)anthracene	U		0.00000410	0.0000500	
Benzo(a)pyrene	U		0.0000116	0.0000500	
Benzo(b)fluoranthene	U		0.00000212	0.0000500	
Benzo(g,h,i)perylene	U		0.0000227	0.0000500	
Benzo(k)fluoranthene	U		0.0000136	0.0000500	
Chrysene	U		0.0000108	0.0000500	
Dibenz(a,h)anthracene	U		0.00000396	0.0000500	
Fluoranthene	U		0.0000157	0.0000500	
Fluorene	U		0.00000850	0.0000500	
Indeno(1,2,3-cd)pyrene	U		0.0000148	0.0000500	
Naphthalene	U		0.0000198	0.000250	
Phenanthrene	U		0.00000820	0.0000500	
Pyrene	U		0.0000117	0.0000500	
1-Methylnaphthalene	U		0.00000821	0.000250	
2-Methylnaphthalene	U		0.00000902	0.000250	
2-Chloronaphthalene	U		0.00000647	0.000250	
(S) Nitrobenzene-d5	85.9		31.0-160		
(S) 2-Fluorobiphenyl	93.6		48.0-148		
(S) p-Terphenyl-d14	92.9		37.0-146		

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3262845-1 11/02/17 23:46 • (LCSD) R3262845-2 11/03/17 00:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.00200	0.00183	0.00193	91.4	96.3	64.0-142			5.21	20
Acenaphthene	0.00200	0.00173	0.00178	86.7	89.2	66.0-132			2.89	20
Acenaphthylene	0.00200	0.00183	0.00191	91.3	95.5	65.0-132			4.46	20
Benzo(a)anthracene	0.00200	0.00195	0.00201	97.6	101	59.0-134			3.00	20
Benzo(a)pyrene	0.00200	0.00175	0.00184	87.6	91.9	61.0-145			4.76	20
Benzo(b)fluoranthene	0.00200	0.00180	0.00183	90.0	91.7	57.0-136			1.87	20
Benzo(g,h,i)perylene	0.00200	0.00182	0.00191	90.9	95.6	54.0-140			4.94	20
Benzo(k)fluoranthene	0.00200	0.00164	0.00171	82.1	85.6	57.0-141			4.11	20
Chrysene	0.00200	0.00163	0.00169	81.3	84.3	63.0-140			3.65	20
Dibenz(a,h)anthracene	0.00200	0.00197	0.00205	98.5	103	49.0-141			3.98	20
Fluoranthene	0.00200	0.00173	0.00179	86.3	89.7	65.0-143			3.96	20



## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3262845-1 11/02/17 23:46 • (LCSD) R3262845-2 11/03/17 00:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Fluorene	0.00200	0.00183	0.00187	91.5	93.3	64.0-129			1.95	20
Indeno(1,2,3-cd)pyrene	0.00200	0.00185	0.00193	92.7	96.6	53.0-141			4.16	20
Naphthalene	0.00200	0.00197	0.00204	98.6	102	68.0-129			3.45	20
Phenanthrene	0.00200	0.00154	0.00164	77.2	81.8	62.0-132			5.89	20
Pyrene	0.00200	0.00150	0.00155	74.8	77.6	58.0-156			3.74	20
1-Methylnaphthalene	0.00200	0.00199	0.00207	99.7	103	68.0-137			3.57	20
2-Methylnaphthalene	0.00200	0.00188	0.00194	94.2	97.1	68.0-134			3.02	20
2-Chloronaphthalene	0.00200	0.00180	0.00188	89.9	93.8	65.0-129			4.24	20
(S) Nitrobenzene-d5				83.6	86.3	31.0-160				
(S) 2-Fluorobiphenyl				90.3	92.0	48.0-148				
(S) p-Terphenyl-d14				90.0	90.9	37.0-146				

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc

[L947437-13,15](#)

## Method Blank (MB)

(MB) R3263732-3 11/07/17 06:25

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg	1 Cp
Anthracene	U		0.000600	0.00600	
Acenaphthene	U		0.000600	0.00600	
Acenaphthylene	U		0.000600	0.00600	
Benzo(a)anthracene	U		0.000600	0.00600	
Benzo(a)pyrene	U		0.000600	0.00600	
Benzo(b)fluoranthene	U		0.000600	0.00600	
Benzo(g,h,i)perylene	U		0.000600	0.00600	
Benzo(k)fluoranthene	U		0.000600	0.00600	
Chrysene	U		0.000600	0.00600	
Dibenz(a,h)anthracene	U		0.000600	0.00600	
Fluoranthene	U		0.000600	0.00600	
Fluorene	U		0.000600	0.00600	
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600	
Naphthalene	U		0.00200	0.0200	
Phenanthrene	U		0.000600	0.00600	
Pyrene	U		0.000600	0.00600	
1-Methylnaphthalene	U		0.00200	0.0200	
2-Methylnaphthalene	U		0.00200	0.0200	
2-Chloronaphthalene	U		0.00200	0.0200	
(S) Nitrobenzene-d5	65.4		14.0-149		
(S) 2-Fluorobiphenyl	74.6		34.0-125		
(S) p-Terphenyl-d14	75.3		23.0-120		

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263732-1 11/07/17 05:42 • (LCSD) R3263732-2 11/07/17 06:03

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.0800	0.0710	0.0745	88.7	93.2	50.0-125			4.85	20
Acenaphthene	0.0800	0.0694	0.0724	86.8	90.6	52.0-120			4.24	20
Acenaphthylene	0.0800	0.0694	0.0722	86.8	90.2	51.0-120			3.88	20
Benzo(a)anthracene	0.0800	0.0683	0.0714	85.4	89.3	46.0-121			4.41	20
Benzo(a)pyrene	0.0800	0.0685	0.0703	85.6	87.9	42.0-121			2.62	20
Benzo(b)fluoranthene	0.0800	0.0651	0.0762	81.4	95.2	42.0-123			15.7	20
Benzo(g,h,i)perylene	0.0800	0.0727	0.0775	90.9	96.9	43.0-128			6.45	20
Benzo(k)fluoranthene	0.0800	0.0745	0.0729	93.1	91.1	45.0-128			2.18	20
Chrysene	0.0800	0.0695	0.0725	86.9	90.6	48.0-127			4.18	20
Dibenz(a,h)anthracene	0.0800	0.0744	0.0791	93.0	98.9	43.0-132			6.18	20
Fluoranthene	0.0800	0.0711	0.0745	88.8	93.1	49.0-129			4.68	20

ACCOUNT:

Absaroka Energy &amp; Environmental - WY

PROJECT:

JBO.MT.0124.01

SDG:

L947437

DATE/TIME:

11/30/17 07:44

PAGE:

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L947437-13,15

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263732-1 11/07/17 05:42 • (LCSD) R3263732-2 11/07/17 06:03

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Fluorene	0.0800	0.0703	0.0730	87.9	91.2	50.0-120			3.69	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0724	0.0775	90.5	96.9	44.0-131			6.86	20
Naphthalene	0.0800	0.0666	0.0688	83.3	86.0	50.0-120			3.22	20
Phenanthrene	0.0800	0.0697	0.0729	87.1	91.1	48.0-120			4.48	20
Pyrene	0.0800	0.0684	0.0707	85.5	88.4	48.0-135			3.22	20
1-Methylnaphthalene	0.0800	0.0673	0.0712	84.1	89.0	52.0-122			5.63	20
2-Methylnaphthalene	0.0800	0.0649	0.0687	81.1	85.8	52.0-120			5.62	20
2-Chloronaphthalene	0.0800	0.0694	0.0712	86.7	89.0	50.0-120			2.57	20
(S) Nitrobenzene-d5				80.9	84.4	14.0-149				
(S) 2-Fluorobiphenyl				78.8	87.5	34.0-125				
(S) p-Terphenyl-d14				73.3	81.0	23.0-120				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## L947426-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L947426-03 11/07/17 07:53 • (MS) R3263732-4 11/07/17 08:15 • (MSD) R3263732-5 11/07/17 08:37

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Anthracene	0.0800	U	0.0648	0.0690	81.0	86.3	1	20.0-136		6.33	24
Acenaphthene	0.0800	U	0.0621	0.0658	77.7	82.3	1	29.0-124		5.81	20
Acenaphthylene	0.0800	U	0.0624	0.0658	78.0	82.2	1	35.0-120		5.20	20
Benzo(a)anthracene	0.0800	U	0.0605	0.0642	75.6	80.3	1	13.0-132		5.99	27
Benzo(a)pyrene	0.0800	U	0.0643	0.0690	80.4	86.3	1	14.0-138		7.12	27
Benzo(b)fluoranthene	0.0800	U	0.0642	0.0646	80.3	80.8	1	10.0-129		0.610	31
Benzo(g,h,i)perylene	0.0800	U	0.0646	0.0683	80.7	85.4	1	10.0-133		5.63	30
Benzo(k)fluoranthene	0.0800	U	0.0623	0.0710	77.9	88.7	1	15.0-131		12.9	27
Chrysene	0.0800	U	0.0632	0.0669	79.0	83.6	1	15.0-137		5.69	25
Dibenz(a,h)anthracene	0.0800	U	0.0664	0.0692	83.0	86.5	1	15.0-132		4.08	27
Fluoranthene	0.0800	U	0.0664	0.0693	83.1	86.7	1	13.0-139		4.25	28
Fluorene	0.0800	U	0.0629	0.0669	78.6	83.7	1	27.0-122		6.30	22
Indeno(1,2,3-cd)pyrene	0.0800	U	0.0647	0.0677	80.9	84.7	1	11.0-133		4.56	29
Naphthalene	0.0800	U	0.0590	0.0624	73.7	78.0	1	18.0-136		5.63	21
Phenanthrene	0.0800	U	0.0625	0.0666	78.1	83.3	1	15.0-133		6.41	25
Pyrene	0.0800	U	0.0626	0.0653	78.2	81.6	1	11.0-146		4.18	29
1-Methylnaphthalene	0.0800	U	0.0604	0.0643	75.5	80.3	1	24.0-137		6.24	22
2-Methylnaphthalene	0.0800	U	0.0582	0.0616	72.7	77.0	1	23.0-136		5.76	22
2-Chloronaphthalene	0.0800	U	0.0617	0.0656	77.2	82.0	1	36.0-120		6.12	20
(S) Nitrobenzene-d5				66.0	70.8		14.0-149				
(S) 2-Fluorobiphenyl				70.1	75.6		34.0-125				
(S) p-Terphenyl-d14				70.6	71.8		23.0-120				



## Method Blank (MB)

(MB) R3263800-4 11/07/17 17:36

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg	<sup>1</sup> Cp
Anthracene	U		0.000600	0.00600	<sup>2</sup> Tc
Acenaphthene	U		0.000600	0.00600	<sup>3</sup> Ss
Acenaphthylene	U		0.000600	0.00600	<sup>4</sup> Cn
Benzo(a)anthracene	U		0.000600	0.00600	<sup>5</sup> Sr
Benzo(a)pyrene	U		0.000600	0.00600	<sup>6</sup> Qc
Benzo(b)fluoranthene	U		0.000600	0.00600	<sup>7</sup> Gl
Benzo(g,h,i)perylene	U		0.000600	0.00600	<sup>8</sup> Al
Benzo(k)fluoranthene	U		0.000600	0.00600	<sup>9</sup> Sc
Chrysene	U		0.000600	0.00600	
Dibenz(a,h)anthracene	U		0.000600	0.00600	
Fluoranthene	U		0.000600	0.00600	
Fluorene	U		0.000600	0.00600	
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600	
Naphthalene	U		0.00200	0.0200	
Phenanthrene	U		0.000600	0.00600	
Pyrene	U		0.000600	0.00600	
1-Methylnaphthalene	U		0.00200	0.0200	
2-Methylnaphthalene	U		0.00200	0.0200	
2-Chloronaphthalene	U		0.00200	0.0200	
(S) Nitrobenzene-d5	76.4		14.0-149		
(S) 2-Fluorobiphenyl	75.6		34.0-125		
(S) p-Terphenyl-d14	68.7		23.0-120		

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263800-1 11/07/17 16:13 • (LCSD) R3263800-2 11/07/17 16:34

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.0800	0.0794	0.0914	99.3	114	50.0-125			14.1	20
Acenaphthene	0.0800	0.0739	0.0850	92.4	106	52.0-120			14.0	20
Acenaphthylene	0.0800	0.0735	0.0836	91.9	104	51.0-120			12.8	20
Benzo(a)anthracene	0.0800	0.0828	0.0952	103	119	46.0-121			14.0	20
Benzo(a)pyrene	0.0800	0.0833	0.0951	104	119	42.0-121			13.3	20
Benzo(b)fluoranthene	0.0800	0.0820	0.0968	103	121	42.0-123			16.5	20
Benzo(g,h,i)perylene	0.0800	0.0854	0.0955	107	119	43.0-128			11.2	20
Benzo(k)fluoranthene	0.0800	0.0851	0.0976	106	122	45.0-128			13.6	20
Chrysene	0.0800	0.0826	0.0972	103	122	48.0-127			16.2	20
Dibenz(a,h)anthracene	0.0800	0.0784	0.0986	98.0	123	43.0-132	J3		22.8	20
Fluoranthene	0.0800	0.0756	0.0951	94.5	119	49.0-129	J3		22.8	20



## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3263800-1 11/07/17 16:13 • (LCSD) R3263800-2 11/07/17 16:34

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Fluorene	0.0800	0.0767	0.0877	95.8	110	50.0-120			13.4	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0770	0.0987	96.2	123	44.0-131	J3		24.7	20
Naphthalene	0.0800	0.0697	0.0793	87.1	99.1	50.0-120			12.9	20
Phenanthrene	0.0800	0.0782	0.0896	97.7	112	48.0-120			13.7	20
Pyrene	0.0800	0.0885	0.104	111	130	48.0-135			15.8	20
1-Methylnaphthalene	0.0800	0.0731	0.0842	91.4	105	52.0-122			14.1	20
2-Methylnaphthalene	0.0800	0.0695	0.0799	86.8	99.9	52.0-120			13.9	20
2-Chloronaphthalene	0.0800	0.0740	0.0840	92.5	105	50.0-120			12.7	20
(S) Nitrobenzene-d5			90.0	96.2		14.0-149				
(S) 2-Fluorobiphenyl			87.2	97.0		34.0-125				
(S) p-Terphenyl-d14			98.6	111		23.0-120				

<sup>1</sup>Cp<sup>2</sup>Tc<sup>3</sup>Ss<sup>4</sup>Cn<sup>5</sup>Sr<sup>6</sup>Qc<sup>7</sup>Gl<sup>8</sup>Al<sup>9</sup>Sc



## Method Blank (MB)

(MB) R3264246-3 11/09/17 06:47

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg	1 Cp
Anthracene	U		0.000600	0.00600	
Acenaphthene	U		0.000600	0.00600	
Acenaphthylene	U		0.000600	0.00600	
Benzo(a)anthracene	U		0.000600	0.00600	
Benzo(a)pyrene	U		0.000600	0.00600	
Benzo(b)fluoranthene	U		0.000600	0.00600	
Benzo(g,h,i)perylene	U		0.000600	0.00600	
Benzo(k)fluoranthene	U		0.000600	0.00600	
Chrysene	U		0.000600	0.00600	
Dibenz(a,h)anthracene	U		0.000600	0.00600	
Fluoranthene	U		0.000600	0.00600	
Fluorene	U		0.000600	0.00600	
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600	
Naphthalene	U		0.00200	0.0200	
Phenanthrene	U		0.000600	0.00600	
Pyrene	U		0.000600	0.00600	
1-Methylnaphthalene	U		0.00200	0.0200	
2-Methylnaphthalene	U		0.00200	0.0200	
2-Chloronaphthalene	U		0.00200	0.0200	
(S) Nitrobenzene-d5	82.9		14.0-149		
(S) 2-Fluorobiphenyl	89.0		34.0-125		
(S) p-Terphenyl-d14	84.3		23.0-120		

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264246-1 11/09/17 06:03 • (LCSD) R3264246-2 11/09/17 06:25

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.0800	0.0685	0.0707	85.6	88.3	50.0-125			3.11	20
Acenaphthene	0.0800	0.0674	0.0704	84.3	88.0	52.0-120			4.35	20
Acenaphthylene	0.0800	0.0667	0.0705	83.4	88.2	51.0-120			5.63	20
Benzo(a)anthracene	0.0800	0.0670	0.0673	83.7	84.1	46.0-121			0.470	20
Benzo(a)pyrene	0.0800	0.0657	0.0661	82.2	82.6	42.0-121			0.550	20
Benzo(b)fluoranthene	0.0800	0.0660	0.0659	82.5	82.4	42.0-123			0.120	20
Benzo(g,h,i)perylene	0.0800	0.0688	0.0712	86.0	89.0	43.0-128			3.43	20
Benzo(k)fluoranthene	0.0800	0.0694	0.0742	86.8	92.8	45.0-128			6.71	20
Chrysene	0.0800	0.0685	0.0705	85.7	88.2	48.0-127			2.86	20
Dibenz(a,h)anthracene	0.0800	0.0713	0.0733	89.2	91.7	43.0-132			2.78	20
Fluoranthene	0.0800	0.0737	0.0733	92.1	91.6	49.0-129			0.540	20



L947437-32

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3264246-1 11/09/17 06:03 • (LCSD) R3264246-2 11/09/17 06:25

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Fluorene	0.0800	0.0681	0.0705	85.1	88.1	50.0-120			3.44	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0692	0.0714	86.5	89.2	44.0-131			3.13	20
Naphthalene	0.0800	0.0665	0.0692	83.2	86.5	50.0-120			3.96	20
Phenanthrene	0.0800	0.0662	0.0677	82.8	84.7	48.0-120			2.27	20
Pyrene	0.0800	0.0599	0.0638	74.9	79.7	48.0-135			6.22	20
1-Methylnaphthalene	0.0800	0.0643	0.0695	80.4	86.8	52.0-122			7.66	20
2-Methylnaphthalene	0.0800	0.0620	0.0672	77.5	84.0	52.0-120			7.96	20
2-Chloronaphthalene	0.0800	0.0699	0.0713	87.4	89.1	50.0-120			1.94	20
(S) Nitrobenzene-d5				93.9	89.6	14.0-149				
(S) 2-Fluorobiphenyl				107	95.7	34.0-125				
(S) p-Terphenyl-d14				94.4	87.6	23.0-120				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## L948320-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L948320-01 11/09/17 12:16 • (MS) R3264246-4 11/09/17 12:38 • (MSD) R3264246-5 11/09/17 12:59

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Anthracene	0.100	ND	0.0753	0.0724	75.4	72.4	1	20.0-136			3.99	24
Acenaphthene	0.100	ND	0.0766	0.0749	76.6	75.0	1	29.0-124			2.20	20
Acenaphthylene	0.100	ND	0.0783	0.0758	78.4	75.8	1	35.0-120			3.34	20
Benzo(a)anthracene	0.100	ND	0.0694	0.0637	69.4	63.7	1	13.0-132			8.56	27
Benzo(a)pyrene	0.100	ND	0.0712	0.0661	71.2	66.1	1	14.0-138			7.41	27
Benzo(b)fluoranthene	0.100	ND	0.0641	0.0616	64.1	61.6	1	10.0-129			4.02	31
Benzo(g,h,i)perylene	0.100	ND	0.0679	0.0632	68.0	63.2	1	10.0-133			7.23	30
Benzo(k)fluoranthene	0.100	ND	0.0736	0.0669	73.7	66.9	1	15.0-131			9.65	27
Chrysene	0.100	ND	0.0694	0.0664	69.5	66.5	1	15.0-137			4.41	25
Dibenz(a,h)anthracene	0.100	ND	0.0691	0.0632	69.1	63.2	1	15.0-132			8.88	27
Fluoranthene	0.100	ND	0.0757	0.0708	75.7	70.8	1	13.0-139			6.68	28
Fluorene	0.100	ND	0.0749	0.0724	74.9	72.5	1	27.0-122			3.27	22
Indeno(1,2,3-cd)pyrene	0.100	ND	0.0677	0.0628	67.7	62.8	1	11.0-133			7.55	29
Naphthalene	0.100	ND	0.0831	0.0805	78.3	75.7	1	18.0-136			3.15	21
Phenanthrene	0.100	ND	0.0722	0.0697	72.2	69.7	1	15.0-133			3.58	25
Pyrene	0.100	ND	0.0682	0.0644	68.2	64.4	1	11.0-146			5.72	29
1-Methylnaphthalene	0.100	ND	0.0801	0.0768	77.0	73.6	1	24.0-137			4.27	22
2-Methylnaphthalene	0.100	ND	0.0781	0.0757	73.7	71.3	1	23.0-136			3.09	22
2-Chloronaphthalene	0.100	ND	0.0800	0.0772	80.1	77.3	1	36.0-120			3.56	20
(S) Nitrobenzene-d5					87.7	80.5		14.0-149				
(S) 2-Fluorobiphenyl					89.7	82.7		34.0-125				
(S) p-Terphenyl-d14					74.9	66.1		23.0-120				

ACCOUNT:

Absaroka Energy &amp; Environmental - WY

PROJECT:

JBO.MT.0124.01

SDG:

L947437

DATE/TIME:

11/30/17 07:44

PAGE:

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## Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

## Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].	<sup>1</sup> Cp
MDL	Method Detection Limit.	<sup>2</sup> Tc
ND	Not detected at the Reporting Limit (or MDL where applicable).	<sup>3</sup> Ss
RDL	Reported Detection Limit.	<sup>4</sup> Cn
Rec.	Recovery.	<sup>5</sup> Sr
RPD	Relative Percent Difference.	<sup>6</sup> Qc
SDG	Sample Delivery Group.	<sup>7</sup> GI
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.	<sup>8</sup> AI
U	Not detected at the Reporting Limit (or MDL where applicable).	<sup>9</sup> SC
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.	
Dilution	If the sample matrix contains an interfering material, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.	
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.	
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.	
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.	
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.	
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.	
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.	
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.	
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.	
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.	

## Qualifier      Description

B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
T8	Sample(s) received past/too close to holding time expiration.



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

## State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey—NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina <sup>1</sup>	DW21704
Florida	E87487	North Carolina <sup>2</sup>	41
Georgia	NELAP	North Dakota	R-140
Georgia <sup>1</sup>	923	Ohio—VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky <sup>1</sup>	90010	South Dakota	n/a
Kentucky <sup>2</sup>	16	Tennessee <sup>14</sup>	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

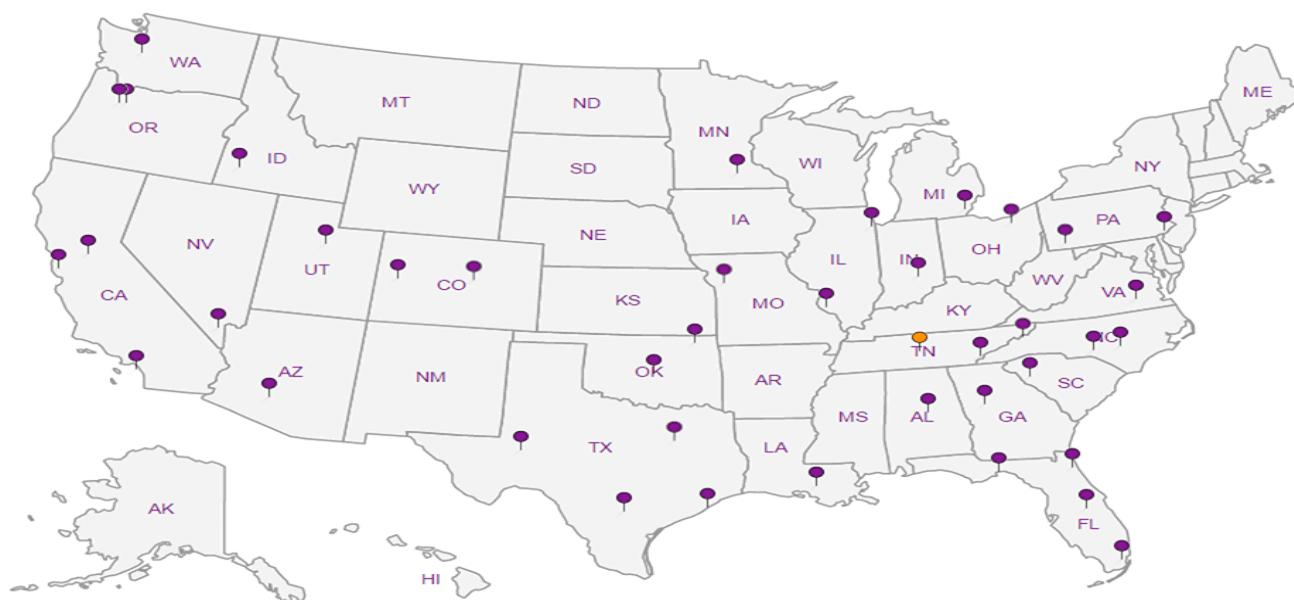
## Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>n/a</sup> Accreditation not applicable

## Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

Company Name/Address:  Absaroka Energy and Environmental Solutions LLC 112 High Street Buffalo, WY 82834				Billing Information:  accounts payable - Randolph Moses 112 High Street Buffalo, Wyoming 82834				Analysis / Container / Preservative				Chain of Custody	Page <b>1 of 15</b>		
Report to:  Randolph J. Moses				Email To:  randolph.moses@absarokasolutions.com								 <b>L-A-B S-C-I-E-N-C-E-S</b> <b>YOUR LAB OF CHOICE</b> 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859			
Project: Listou 21-35-18B Description:				City/State Montana Collected:											
Phone: 855.684.5891 Fax:	Client Project # JBO.MT.0124.01			Lab Project # ABSENEBWY-Listou											
Collected by (print):	Site/Facility ID #			P.O. #											
Collected by (signature):  Immediately Packed on Ice: N <input checked="" type="checkbox"/> Y <input checked="" type="checkbox"/>	<b>Rush?</b> (Lab MUST Be Notified)  Same Day ..... 200% Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%			Date/Results Needed  Email? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes FAX? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes				No. of Cntr							
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	SAR 4ozClr - No Pres	SV8270PAHSIM 4ozClr-NoPres	SVEPHMT 4ozAmb-NoPres	Sulfate, SPCON, pH 4 ozClr-NoPres	TCLP Metals+nickel 8 0zCLR-NoPres	TS 4ozCLR-NoPres	VPHMT 40mlAmbMeOH15mm/Syr	Retain for later testing	Rem./Contaminant	Sample # (lab only)
P2-P3	Grab	SS	0-3in	10/24/17	1520	4 <input checked="" type="checkbox"/>	X			X				-01	
P3-P4	Grab	SS	0-3in	10/24/17	1525	3 <input checked="" type="checkbox"/>	X			X				02	
P4-P5	Comp	SS	0-3in	10/24/17	1535	3 <input checked="" type="checkbox"/>	X			X				03	
P5-P6	Comp	SS	0-3in	10/24/17	1550	3 <input checked="" type="checkbox"/>	X			X				04	
P6-P7	Comp	SS	0-3in	10/24/17	1600	3 <input checked="" type="checkbox"/>	X			X				05	
P7-P8	Comp	SS	0-3in	10/24/17	1605	3 <input checked="" type="checkbox"/>	X			X				06	
P8-P9	Comp	SS	0-3in	10/24/17	1610	3 <input checked="" type="checkbox"/>	X			X				07	
P9-P10	Comp	SS	0-3in	10/24/17	1625	3 <input checked="" type="checkbox"/>	X			X				08	
P10-P11	Comp	SS	0-3in	10/24/17	1635	3 <input checked="" type="checkbox"/>	X			X				09	
P11-P12	Comp	SS	0-3	10/24/17	1645	3 <input checked="" type="checkbox"/>	X			X				10	
* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other										pH	Temp				
Remarks: If EPH Screen is over 200 mg/Kg, follow supplementary testing procedure.										Flow	Other				
Relinquished by : (Signature)  <i>Randolph Moses</i>		Date: 10/29/17	Time: 014:15	Received by: (Signature) 7474 0941 1552		Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>		Condition: (lab use only)  <i>06</i>							
Relinquished by : (Signature)		Date:	Time:	Received by: (Signature)		Temp: °C Bottles Received:  <i>21.33 14512</i>		COC Seal Intact: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA							
Relinquished by : (Signature)		Date:	Time:	Received for lab by: (Signature)  <i>DD Bob 834</i>		Date: 10-31-17 Time: 0845		pH Checked: <input type="checkbox"/> NCF:  <i>/</i>							

Company Name/Address:			Billing Information: accounts payable - Randolph Moses 112 High Street Buffalo, Wyoming 82834			Analysis / Container / Preservative			Chain of Custody Page 2 of 15					
Absaroka Energy and Environmental Solutions LLC 112 High Street Buffalo, WY 82834									 <b>L-A-B S-C-I-E-N-C-E-S</b> <b>YOUR LAB OF CHOICE</b> 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5858 Fax: 615-758-5859  L# <b>L9417437</b>					
Report to: Randolph J. Moses			Email To: randolph.moses@absarokasolutions.com											
Project Listou 21-35-18B Description:			City/State Montana Collected:											
Phone: 855.684.5891 Fax:	Client Project # JBO.MT.0124.01		Lab Project # ABSENEBWY-Listou											
Collected by (print):	Site/Facility ID #		P.O. #											
Collected by (signature):  Immediately Packed on Ice N <input checked="" type="checkbox"/>	<b>Rush?</b> (Lab MUST Be Notified)  Same Day ..... 200% Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%		Date Results Needed											
			Email? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes FAX? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	No. of										
Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	Cntrs of	SAR 4ozClr - No Pres	SV8270PAHSIM 4ozClr-NoPres	SVEPHMT 4ozAmb-NoPres	Sulfate, SPCON, pH 4 ozClr-NoPres	TCLP Metals+nickel 8 ozCLR-NoPres	TS 4ozCLR-NoPres	VPHMT 40mlAmb)MeOH15mm/Syr	Retain for later testing
X C20D21	Grab	SS	0-3in	10/25/17	0910	4-3		X				X		
C20	Grab	SS	0-3in	10/25/17	0830	1						X	Hold	
C21	Comp	SS	0-3in	10/25/17	0835	1						X		
D20	Comp	SS	0-3in	10/25/17	0840	1						X		
D21	Comp	SS	0-3in	10/25/17	0845	1						X		
E19F20	Comp	SS	0-3in	10/25/17	0930	34		X				X		
E19	Comp	SS	0-3in	10/25/17	0920	1						X	Hold	
E20	Comp	SS	0-3in	10/25/17	0915	1						X		
F19	Comp	SS	0-3in	10/25/17	0925	1						X		
F20	Comp	SS	0-3in	10/25/17	0925	1						X		

\* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other \_\_\_\_\_

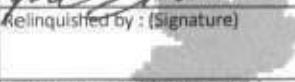
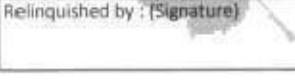
pH: \_\_\_\_\_ Temp: \_\_\_\_\_

Remarks: If EPH Screen is over 200 mg/Kg, follow supplementary testing procedure.

Flow: \_\_\_\_\_ Other: \_\_\_\_\_

Relinquished by : (Signature)		Date: 10/25/17	Time: 1415	Received by: (Signature)	Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>	Condition: (lab use only)
Relinquished by : (Signature)		Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received: 24 14542 ft	Hold #: COC Seal Intact: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA
Relinquished by : (Signature)		Date:	Time:	Received for lab by: (Signature)	Date: 10-31-17 Time: 0845	pH Checked: <input type="checkbox"/> NCF: <input type="checkbox"/>

Company Name/Address:  Absaroka Energy and Environmental Solutions LLC 112 High Street Buffalo, WY 82834			Billing Information:  accounts payable - Randolph Moses 112 High Street Buffalo, Wyoming 82834			Analysis / Container / Preservative			Chain of Custody  <b>ESC</b> L-A-B S-C-I-E-N-C-E-S YOUR LAB OF CHOICE  12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859	Page <b>3 of 15</b>	
Report to:  Randolph J. Moses			Email To:  randolph.moses@absarokasolutions.com								
Project Listou 21-35-18B Description:			City/State Montana Collected:								
Phone: 855.684.5891 Fax:	Client Project # JBO.MT.0124.01		Lab Project # ABSENEBWY-Listou								
Collected by (print):	Site/Facility ID #		P.O. #								
Collected by (signature):  immediately Packed on Ice N <input checked="" type="checkbox"/>	Rush? (Lab MUST Be Notified)  Same Day ..... 200% Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%		Date Results Needed  Email? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes FAX? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes No. of Cans <input checked="" type="checkbox"/>			SAR 4ozCIR - No Pres  SV8270PAHSIM 4ozCIR-NoPres  SVEPHMT 4ozAmb-NoPres  Sulfate, SPCON, pH 4 ozCIR-NoPres  TCLP Metals+nickel 8 OzCLR-NoPres  TS 4ozCLR-NoPres  VPHMT 40mlAmb\MeOH15mm\Syr					
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time						
BGU	Grab	SS	0-3in	10/24/17	1330	U <input checked="" type="checkbox"/>	X	X	X	X	X
BGW	Grab	SS	0-3in	10/24/17	1345	S <input checked="" type="checkbox"/>	X	X	X	X	X
P0-P1	Comp	SS	0-3in	10/24/17	1439	S <input checked="" type="checkbox"/>		X			X
P1-P2	Comp	SS	0-3in	10/24/17	1445	S <input checked="" type="checkbox"/>		X			X
M27N28	Comp	SS	0-3in	10/26/17	1355	S <input checked="" type="checkbox"/>		X			X
M27	Comp	SS	0-3in	10/26/17	1355	1 <input checked="" type="checkbox"/>					
M28	Comp	SS	0-3in	10/26/17	1340	1 <input checked="" type="checkbox"/>					X
N27	Comp	SS	0-3in	10/26/17	1345	1 <input checked="" type="checkbox"/>					X
N28	Comp	SS	0-3in	10/26/17	1350	1 <input checked="" type="checkbox"/>					X
* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other						pH _____ Temp _____					
Remarks: If EPH Screen is over 200 mg/Kg, follow supplementary testing procedure.						Flow _____ Other _____			Hold # _____		
Relinquished by : (Signature)  <i>Randolph Moses</i>		Date: 10/30/17	Time: 14:15	Received by: (Signature)		Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>			Condition: (lab use only)		
Relinquished by : (Signature)		Date:	Time:	Received by: (Signature)		Temp: 24 °C Bottles Received: 145 + 24 HCl			COC Seal Intact: Y N NA		
Relinquished by : (Signature)		Date:	Time:	Received for lab by: (Signature)  <i>DB - 834</i>		Date: 10/31/17	Time: 0845	pH Checked:	NCF:		

Company Name/Address: <b>Absaroka Energy &amp; Environmental</b> 112 High St. Buffalo, WY 82834			Billing Information: Accounts Payable-Randolph Moses 112 High St. Buffalo, WY 82834			Analysis / Container / Preservative			Chain of Custody Page <b>4</b> of <b>15</b>		
Report to: <b>Randolph Moses</b>			Email To: <b>Randolph.moses@absarokasolutions.c</b>						 <b>L-A-B S-C-I-E-N-C-E-S</b> <b>YOUR LAB OF CHOICE</b> 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859 		
Project <b>Listou 21-35-18B</b> Description:			City/State <b>MT</b> Collected:								
Phone: (307) 620-9015 Fax:	Client Project # <b>JBO.MT.0124.01</b>		Lab Project #								
Collected by (print): <b>MK/CW/HH</b>	Site/Facility ID #		P.O. #								
Collected by (signature):  Immediately Packed on Ice N <input checked="" type="checkbox"/> Y <input type="checkbox"/>	<b>Rush?</b> (Lab MUST Be Notified)		Date Results Needed								
	Same Day	200%	Next Day	100%	Two Day	50%	Three Day	25%	Email? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	FAX? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	No. of Cntrs <b>04</b>
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time						
x G18H19	Comp	SS	0-3"	10/25/2017	1155	4 3	X	X			
G18	Comp	SS	0-3"	10/25/2017	1130	1					
H18	Comp	SS	0-3"	10/25/2017	1135	1					
G19	Comp	SS	0-3"	10/25/2017	1140	1					
H19	Comp	SS	0-3"	10/25/2017	1145	1					
x I18J19	Comp	SS	0-3"	10/25/2017	1220	4 3	X	X			
I18	Comp	SS	0-3"	10/25/2017	1200	1					
I19	Comp	SS	0-3"	10/25/2017	1145	1					
J18	Comp	SS	0-3"	10/25/2017	1150	1					
I19	Comp	SS	0-3"	10/25/2017	1155	1					
* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other _____						pH _____	Temp. _____				
Remarks: <b>Soil samples</b>						Flow _____	Other _____	Hold # _____			
Relinquished by : (Signature) 		Date: <b>10/30/17</b>	Time: <b>14:15</b>	Received by: (Signature)			Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>	Condition: (lab use only)			
Relinquished by : (Signature) 		Date: _____	Time: _____	Received by: (Signature)			Temp: <b>24.9</b> °C Bottles Received: <b>145+218</b>	COC Seal Intact: <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA			
Relinquished by : (Signature) 		Date: _____	Time: _____	Received for lab by: (Signature) <b>D. B. - 834</b>			Date: <b>10/31/17</b>	Time: <b>0845</b>	pH Checked: _____	NCF: 	

Company Name/Address: <b>Absaroka Energy &amp; Environmental</b> 112 High St. Buffalo, WY 82834		Billing Information: Accounts Payable-Randolph Moses 112 High St. Buffalo, WY 82834		Analysis / Container / Preservative		Chain of Custody Page <b>5 of 15</b>	
Report to: <b>Randolph Moses</b>		Email To: <b>Randolph.moses@absarokasolutions.c</b>				 <b>L-A-B-S-C-I-E-N-C-E-S</b> <b>YOUR LAB OF CHOICE</b> 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859  <b>L#</b> <b>L947457</b>	
Project <b>Listou 21-35-18B</b> Description:		City/State <b>MT</b> Collected:					
Phone: (307) 620-9015 Fax:	Client Project # <b>JBO.MT.0124.01</b>	Lab Project #					
Collected by (print): <b>MK/CW/HH</b>	Site/Facility ID #	P.O. #					
Collected by (signature):  Immediately Packed on Ice N <b>Y ✓</b>	<b>Rush?</b> (Lab MUST Be Notified)  Same Day ..... 200% Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%	Date Results Needed					
		Email? <b>No</b> Yes <b>Yes</b>	FAX? <b>No</b> Yes <b>Yes</b>	No. of Cntrs <b>2</b>			
Sample ID	Comp/Grab	Matrix *	Depth	Date <b>10/25/2017</b>	Time <b>1425</b>	<b>4</b> <b>3</b>	SAR 4ozCLt-NoPres
X K17L18	Comp	SS	0-3"	10/25/2017	1410	1	X SVEPHSMT 4ozAmb-NoPres
K17	Comp	SS	0-3"	10/25/2017	1415	1	VPHMT 40mlAmb/MeOH15ml/Syr
K18	Comp	SS	0-3"	10/25/2017	1420	1	TS 4OZ Clr - No pres
L17	Comp	SS	0-3"	10/25/2017	1405	01	TCLP Metals + Nickel - no pres
L18	Comp	SS	0-3"	10/25/2017	1445	3	Sulphate SPCON Ph
X K19L20	Comp	SS	0-3"	10/25/2017	1425	1	SV8270PAHSIM
K19	Comp	SS	0-3"	10/25/2017	1430	1	
K20	Comp	SS	0-3"	10/25/2017	1435	1	
L19	Comp	SS	0-3"	10/25/2017	1440	1	
L20	Comp	SS	0-3"	10/25/2017			
* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other _____						pH _____	Temp _____
Remarks: <b>soil samples</b>						Flow _____	Other _____
Relinquished by : (Signature) <b>Randolph Moses</b>		Date: <b>10/30/17</b>	Time: <b>14:15</b>	Received by: (Signature)		Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>	Hold #: _____
Relinquished by : (Signature)		Date: _____	Time: _____	Received by: (Signature)		Condition: <b>(lab use only)</b>	
Relinquished by : (Signature)		Date: _____	Time: _____	Received for lab by: (Signature) <b>QD R - 834</b>		Temp: <b>24.50</b> °C Bottles Received: <b>14512</b> <b>fl oz</b>	Condition: <b>(lab use only)</b>
						QC Seal Intact: <b>Y N NA</b>	
						pH Checked: _____	NCF: <b>/</b>

Company Name/Address:			Billing Information: accounts payable - Randolph Moses 112 High Street Buffalo, Wyoming 82834			Analysis / Container / Preservative			Chain of Custody Page <b>6</b> of <b>15</b>						
Absaroka Energy and Environmental Solutions LLC 112 High Street Buffalo, WY 82834									 <b>YOUR LAB OF CHOICE</b> 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859 L# <b>L947437</b>						
Report to: <b>Randolph J. Moses</b>			Email To: <b>randolph.moses@absarokasolutions.com</b>												
Project <b>Listou 21-35-18B</b> Description:			City/State <b>Montana</b> Collected:												
Phone: 855.684.5891 Fax:	Client Project # <b>JBO.MT.0124.01</b>		Lab Project # <b>ABSENEBWY-Listou</b>												
Collected by (print):	Site/Facility ID #		P.O. #												
Collected by (signature):  Immediately Packed on Ice N <b>Y</b> X	<b>Rush?</b> (Lab MUST Be Notified)  Same Day ..... 200% Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%		Date Results Needed  Email? <b>No</b> Yes FAX? <b>No</b> Yes No. of: <b>02</b>												
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs: <b>02</b>	SAR 4ozCLR - No Pres	SV8270PAHSIM 4ozCLR-NoPres	SVEPHMT 4ozAMB-NoPres	Sulfate, SPCON, pH 4 ozCLR-NoPres	TCLP Metals+nickel 8 ozCLR-NoPres	TS 4ozCLR-NoPres	VPHMT 40mlAMBMeOH15mm/Syr		Retain for later testing
X C22D23	Grab	SS	0-3in	10/25/17	1015	1/3		X				X			
C22	Grab	SS	0-3in	10/25/17	1005	1								X hold	
D22	Comp	SS	0-3in	10/25/17	1010	1								X /	
D23	Comp	SS	0-3in	10/25/17	1000	1								X 26	
X E21F22	Comp	SS	0-3in	10/25/17	1030	1/3		X				X			
E21	Comp	SS	0-3in	10/25/17	1015	1								X hold	
E22	Comp	SS	0-3in	10/25/17	1020	1								X /	
F21	Comp	SS	0-3in	10/25/17	1025	1								X /	
F22	Comp	SS	0-3in	10/25/17	1020	1								X /	
	Comp	SS													

\* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other \_\_\_\_\_

pH \_\_\_\_\_ Temp \_\_\_\_\_

Remarks: If EPH Screen is over 200 mg/Kg, follow supplementary testing procedure.

Flow \_\_\_\_\_ Other \_\_\_\_\_

Relinquished by : (Signature)

Date: **10/30/17** Time: **14:15**

Received by: (Signature)

Samples returned via:  UPS

FedEx  Courier

Hold #: \_\_\_\_\_ Condition: (lab use only) \_\_\_\_\_

Relinquished by : (Signature)

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Received by: (Signature)

Temp: **27.4** °C Bottles Received: **145 + 218**

Condition: (lab use only) \_\_\_\_\_ COC Seal Intact: **Y** **N** **NA**

Relinquished by : (Signature)

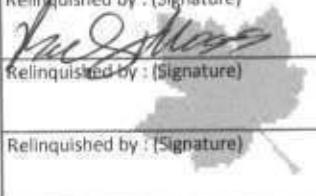
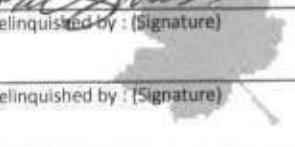
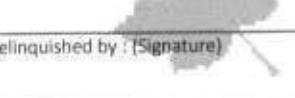
Date: \_\_\_\_\_ Time: \_\_\_\_\_

Received for lab by: (Signature)

Date: **10/31/17** Time: **8845**

pH Checked: \_\_\_\_\_ NCF: \_\_\_\_\_

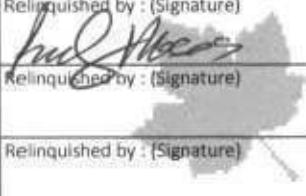
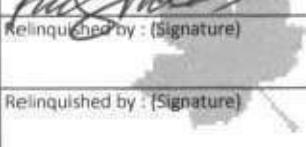
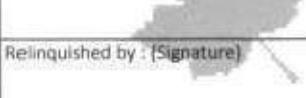
Company Name/Address:  Absaroka Energy and Environmental Solutions LLC 112 High Street Buffalo, WY 82834		Billing Information:  accounts payable - Randolph Moses 112 High Street Buffalo, Wyoming 82834				Analysis / Container / Preservative				Chain of Custody  <b>ESC</b> L-A-B S-C-I-E-N-C-E-S YOUR LAB OF CHOICE 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859  Lab # L947437 Table # Acctnum: ABSENEBWY Template: T129208 Prelogin: P623547 TSR: 728-Shane Gambi PB: Shipped Via: FedEx Standard Rem./Contaminant Sample # (Lab only)				
Report to: Randolph J. Moses		Email To: randolph.moses@absarokasolutions.com												
Project Listou 21-35-18B Description:		City/State Montana Collected:												
Phone: 855.684.5891 Fax:	Client Project # JBO.MT.0124.01	Lab Project # ABSENEBWY-Listou												
Collected by (print):	Site/Facility ID #	P.O. #												
Collected by (signature):  Immediately Packed on Ice N <u>y</u> <u>X</u>	Rush? (Lab MUST Be Notified)  Same Day ..... 200% Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%	Date Results Needed:  Email? <u>No</u> <u>Yes</u> FAX? <u>No</u> <u>Yes</u>				Cntg 91	SAR 4ozClr - No Pres	SV8270PAHSIM 4ozClr-NoPres	SVEPHMT 4ozAmb-NoPres	Sulfate, SPCON, pH 4 ozClr-NoPres	TCLP Metals+nickel 8 OzCLR-NoPres	TS 4ozCLR-NoPres	VPHMT 40mlAmbMeOH15mm/Syr	Retain for later testing
E23H23	Grab	SS	0-3in	10/26/17	0830	4	3	X				X		-20
E23	Grab	SS	0-3in	10/26/17	0810		1					X	hold	
F23	Comp	SS	0-3in	10/26/17	0815		1					X		
G23	Comp	SS	0-3in	10/26/17	0820		1					X		
H23	Comp	SS	0-3in	10/26/17	0825		1					X		
	Comp	SS												
	Comp	SS												
	Comp	SS												
	Comp	SS												
	Comp	SS												
	Comp	SS												
* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other														
pH _____ Temp _____														
Flow _____ Other _____														
Hold #: _____														
Condition: (Lab use only)														
Relinquished by: (Signature)  <u>Randolph Moses</u>		Date: <u>10/30/17</u>	Time: <u>14:15</u>	Received by: (Signature)		Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>		Temp: <u>2.4 m/s 30</u> °C Bottles Received: <u>145+2 HCl</u>						
Relinquished by: (Signature)		Date:	Time:	Received by: (Signature)				COC Seal Intact: <u>Y</u> <u>N</u> <u>NA</u>						
Relinquished by: (Signature)		Date:	Time:	Received for lab by: (Signature)  <u>DTB</u> <u>834</u>		Date: <u>10/31/17</u>	Time: <u>0845</u>	pH Checked:		NCF: <u>/</u>				

Company Name/Address: <b>Absaroka Energy &amp; Environmental</b> 112 High St. Buffalo, WY 82834				Billing Information: Accounts Payable-Randolph Moses 112 High St. Buffalo, WY 82834				Analysis / Container / Preservative				Chain of Custody Page <b>8 of 15</b>			
												 <b>L-A-B S-C-I-E-N-C-E-S</b> <b>YOUR LAB OF CHOICE</b> 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859 			
Report to: <b>Randolph Moses</b>				Email To: <b>Randolph.moses@absarokasolutions.c</b>								L# <b>L94743</b>			
Project: <b>Listou 21-35-18B</b> Description:				City/State <b>MT</b> Collected:								Table #			
Phone: (307) 620-9015 Fax:		Client Project # <b>JBO.MT.0124.01</b>		Lab Project #								Acctnum: <b>ABSENEBWY</b> Template:			
Collected by (print): <b>MK/CW/HH</b>		Site/Facility ID #		P.O. #								Prelogin: <b>TSR: Shane Gambill</b>			
Collected by (signature):		<b>Rush?</b> (Lab MUST Be Notified)		Date Results Needed								Cooler:			
Immediately Packed on Ice N <input checked="" type="checkbox"/> Y <input type="checkbox"/>		<input type="checkbox"/> Same Day ..... 200% <input type="checkbox"/> Next Day ..... 100% <input type="checkbox"/> Two Day ..... 50% <input type="checkbox"/> Three Day ..... 25%		Email? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes		FAX? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes		No. of Cntrs <b>00</b>						Shipped Via: <b>FedEx Standard</b>	
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time								Rem./Contaminant	Sample # (lab only)	
I23K25	Comp	SS	0-3"	10/26/2017	1145	48	X	X						27	
I23	Comp	SS	0-3"	10/26/2017	1145	1							X Hold		
I24	Comp	SS	0-3"	10/26/2017	1145	1							X		
I25	Comp	SS	0-3"	10/26/2017	1145	1							X		
J23	Comp	SS	0-3"	10/26/2017	1145	1							X		
J24	Comp	SS	0-3"	10/26/2017	1145	1							X		
J25	Comp	SS	0-3"	10/26/2017	1145	1							X		
K23	Comp	SS	0-3"	10/25/2017	1145	1							X		
K24	Comp	SS	0-3"	10/26/2017	1145	1							X		
K25	Comp	SS	0-3"	10/25/2017	1145	1							X		
* Matrix: <b>SS</b> - Soil <b>GW</b> - Groundwater <b>WW</b> - WasteWater <b>DW</b> - Drinking Water <b>OT</b> - Other _____														pH _____	Temp _____
Remarks: <b>soil samples</b>														Flow _____	Other _____
Relinquished by : (Signature) 				Date: <b>10/30/17</b>	Time: <b>14:15</b>	Received by: (Signature)				Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>				Hold #	
Relinquished by : (Signature) 				Date:	Time:	Received by: (Signature)				Temp: <b>24.4</b> °C Bottles Received: <b>145+2</b> <sup>b</sup> / <sub>4</sub>				Condition: (lab use only)	
Relinquished by : (Signature) 				Date:	Time:	Received for lab by: (Signature) <b>DB-834</b>				Date: <b>10/31/17</b>	Time: <b>0845</b>	pH Checked:	NCF:		
COC Seal Intact: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA															

Company Name/Address: <b>Absaroka Energy &amp; Environmental</b> 112 High St. Buffalo, WY 82834				Billing Information: Accounts Payable-Randolph Moses 112 High St. Buffalo, WY 82834				Analysis / Container / Preservative				Chain of Custody Page <b>9 of 15</b>		
Report to: <b>Randolph Moses</b>				Email To: <b>Randolph.moses@absarokasolutions.c</b>								 <b>L-A-B S-C-I-E-N-C-E-S</b> <b>YOUR LAB OF CHOICE</b> 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859 		
Project: <b>Listou 21-35-18B</b> Description:				City/State: <b>MT</b> Collected:								L# <b>L947437</b>		
Phone: (307) 620-9015 Fax:	Client Project #: <b>JBO.MT.0124.01</b>			Lab Project #							Table #			
Collected by (print): <b>MK/CW/HH</b>	Site/Facility ID #			P.O. #							Acctnum: <b>ABSENEBWY</b>			
Collected by (signature):  Immediately Packed on Ice N <b>Y ✓</b>	<b>Rush?</b> (Lab MUST Be Notified) <input type="checkbox"/> Same Day ..... 200% <input type="checkbox"/> Next Day ..... 100% <input type="checkbox"/> Two Day ..... 50% <input type="checkbox"/> Three Day ..... 25%			Date Results Needed							Template:			
				Email? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes FAX? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	No. of Cntrs <b>OR</b>					Prelogin: <b>TSR: Shane Gambill</b>				
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time		SAR 4ozCLR-NoPres	SVEPHSMT 4ozAmb-NoPres	VPHMT 40mlAmb/MeOH15ml/Syr	TS 4OZ Clr - No pres	TCLP Metals + Nickel - no pres	Sulphate SPCON Ph	SV8270PAHSIM	Retain for later testing
N21O23	Comp	SS	0-3"	10/26/2017	1320	4 3	X	X						2029
N21	Comp	SS	0-3"	10/26/2017	1320	1							X hold	
N22	Comp	SS	0-3"	10/26/2017	1320	1							X	
N23	Comp	SS	0-3"	10/26/2017	1320	1							X	
O21	Comp	SS	0-3"	10/26/2017	1320	1							X	
O22	Comp	SS	0-3"	10/26/2017	1320	1							X	
O23	Comp	SS	0-3"	10/26/2017	1320	1							X	
	Comp	SS												
	Comp	SS												
	Comp	SS												
	Comp	SS												
* Matrix: <b>SS</b> - Soil <b>GW</b> - Groundwater <b>WW</b> - WasteWater <b>DW</b> - Drinking Water <b>OT</b> - Other _____										pH _____	Temp _____	Hold #		
										Flow _____	Other _____			
Remarks: <b>Soil samples</b>										Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>		Condition: <b>(lab use only)</b>		
Relinquished by : (Signature) <i>Randolph Moses</i>		Date: <b>10/30/17</b>	Time: <b>14:15</b>	Received by: (Signature)			Temp: <b>74.80</b> °C Bottles Received: <b>145+10</b>		COC Seal Intact: <b>Y N NA</b>					
Relinquished by : (Signature)		Date:	Time:	Received by: (Signature)			Date: <b>10-31-17</b> Time: <b>0845</b>		pH Checked: <b> </b> NCF: <b> </b>					
Relinquished by : (Signature)		Date:	Time:	Received for lab by: (Signature) <i>D. B. - 834</i>										

Company Name/Address:  Absaroka Energy and Environmental Solutions LLC 112 High Street Buffalo, WY 82834		Billing Information:  accounts payable - Randolph Moses 112 High Street Buffalo, Wyoming 82834		Analysis / Container / Preservative						Chain of Custody	Page 10 of 15		
Report to:  Randolph J. Moses		Email To:  randolph.moses@absarokasolutions.com								<b>ESC</b> L-A-B-S-C-I-E-N-C-E-S YOUR LAB OF CHOICE 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859			
Project Listou 21-35-18B Description:		City/State Montana Collected:								L# L9417437			
Phone: 855.684.5891 Fax:	Client Project # JBO.MT.0124.01	Lab Project # ABSENEBWY-Listou								Table #			
Collected by (print):	Site/Facility ID #	P.O. #								Acctnum: ABSENEBWY Template: T129208 Prelogin: P623547 TSR: 728-Shane Gambi PB: Shipped Via: FedEx Standard			
Collected by (signature):  Immediately Packed on Ice N Y ✓	Rush? (Lab MUST Be Notified)  Same Day ..... 200% Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%	Date Results Needed								Rem./Contaminant Sample # (lab only)			
		Email? No Yes FAX? No Yes	No. of Encls	SAR 4ozClr - No Pres	SV8270PAHSIM 4ozClr-NoPres	SVEPHMT 4ozAmb-NoPres	Sulfate, SPCON, pH 4 ozClr-NoPres	TCLP Metals+nickel 8 0zCLR-NoPres	TS 4ozCLR-NoPres	VPHMT 40mlAmb\MeOH15mm\Syr			
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time						Retain for later testing		
O17	Comp	SS	0-3in	10/26/17	0945	1 43					X		
O18	Comp	SS	0-3in	10/26/17	0945	1					X Hold		
N16	Comp	SS	0-3in	10/26/17	0945	1					X Hold		
N17	Comp	SS	0-3in	10/26/17	0945	1					X Hold		
N18	Comp	SS	0-3in	10/26/17	0945	1					X Hold		
C18D19	Comp	SS	0-3in	10/26/17	0930	4 38	X		X		2925		
C18	Comp	SS	0-3in	10/26/17	0930	1					X Hold		
C19	Comp	SS	0-3in	10/26/17	0930	1					X Hold		
D18	Comp	SS	0-3in	10/26/17	0930	1					X Hold		
D19	Comp	SS	0-3in	10/26/17	0930	1					X Hold		
* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other						pH	Temp						
Remarks: If EPH Screen is over 200 mg/Kg, follow supplementary testing procedure.						Flow	Other						
Relinquished by: (Signature)		Date: 10/30/17	Time: 14:25	Received by: (Signature)		Samples returned via:		UPS	Hold #		Condition: (lab use only)		
Relinquished by: (Signature)		Date:	Time:	Received by: (Signature)		Samples returned via:		FedEx	COC Seal Intact: Y N NA		Condition: (lab use only)		
Relinquished by: (Signature)		Date:	Time:	Received for lab by: (Signature)		Temp: 24.5°C	Bottles Received: 145+218	pH Checked:		NCF:			

Company Name/Address: <b>Absaroka Energy &amp; Environmental</b> 112 High St. Buffalo, WY 82834			Billing Information: Accounts Payable-Randolph Moses 112 High St. Buffalo, WY 82834			Analysis / Container / Preservative			Chain of Custody	Page <b>11</b> of <b>15</b>	
Report to: <b>Randolph Moses</b>			Email To: <b>Randolph.moses@absarokasolutions.c</b>						<b>ESC</b> LAB SCIENCES		
Project: <b>Listou 21-35-18B</b> Description:			City/State: <b>MT</b> Collected:						12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859		
Phone: (307) 620-9015 Fax:		Client Project # <b>JBO.MT.0124.01</b>		Lab Project #						<b>YOUR LAB OF CHOICE</b>	
Collected by (print): <b>MK/CW/HH</b>		Site/Facility ID #		P.O. #						<b>L# L947437</b>	
Collected by (signature):  Immediately Packed on Ice N <input checked="" type="checkbox"/> Y <input type="checkbox"/>		<b>Rush?</b> (Lab MUST Be Notified)  Same Day ..... 200% Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%		Date Results Needed						Table #	
				Email? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes FAX? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	No. of Cntrs <i>GR</i>				Acctnum: <b>ABSENEBWY</b>		
Sample ID		Comp/Grab	Matrix *	Depth	Date	Time				Template:	
M24O26		Comp	SS	0-3"	10/26/2017	1230	4 <i>8</i>	X X	TS 4OZ Clr - No pres	Prelogin:	
M24		Comp	SS	0-3"	10/26/2017	1230	1		TCLP Metals + Nickel - no pres	TSR: <b>Shane Gambill</b>	
M25		Comp	SS	0-3"	10/26/2017	1230	1		Sulphate SPCON Ph	Cooler:	
M26		Comp	SS	0-3"	10/26/2017	1230	1		SV8270PAHSIM	Shipped Via: <b>FedEx Standa</b>	
N24		Comp	SS	0-3"	10/26/2017	1230	1			Rem./Contaminant	
N25		Comp	SS	0-3"	10/26/2017	1230	1			Sample # (lab only)	
N26		Comp	SS	0-3"	10/26/2017	1230	1			<i>10 20</i>	
O24		Comp	SS	0-3"	10/25/2017	1230	1				
O25		Comp	SS	0-3"	10/26/2017	1230	1				
O26		Comp	SS	0-3"	10/25/2017	1230	1				
* Matrix: <b>SS</b> - Soil <b>GW</b> - Groundwater <b>WW</b> - WasteWater <b>DW</b> - Drinking Water <b>OT</b> - Other _____									pH _____	Temp _____	
Remarks: <b>soil samples</b>									Flow _____	Other _____	
Relinquished by : (Signature) <i>Randolph Moses</i>		Date: <i>10/30/17</i>	Time: <i>14:15</i>	Received by: (Signature)			Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/> _____			Hold #	
Relinquished by : (Signature) <i>Randolph Moses</i>		Date: _____	Time: _____	Received by: (Signature)			Temp: <b>24.4 mg/50</b> °C Bottles Received: <b>145+213</b>			Condition: (lab use only)	
Relinquished by : (Signature) <i>Randolph Moses</i>		Date: _____	Time: _____	Received by: (Signature)			COC Seal Intact: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA			pH Checked: _____ NCF: _____	

Company Name/Address: <b>Absaroka Energy &amp; Environmental</b> 112 High St. Buffalo, WY 82834			Billing Information: Accounts Payable-Randolph Moses 112 High St. Buffalo, WY 82834			Analysis / Container / Preservative			Chain of Custody Page <b>12</b> of <b>15</b>		
Report to: <b>Randolph Moses</b>			Email To: <b>Randolph.moses@absarokasolutions.c</b>						 <b>L-A-B S-C-I-E-N-C-E-S</b> <b>YOUR LAB OF CHOICE</b> 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859  <b>L# L947437</b>		
Project <b>Listou 21-35-18B</b> Description:			City/State <b>MT</b> Collected:								
Phone: (307) 620-9015 Fax:	Client Project # <b>JBO.MT.0124.01</b>		Lab Project #								
Collected by {print}: <b>MK/CW/HH</b>	Site/Facility ID #		P.O. #								
Collected by {signature}:	<b>Rush?</b> (Lab MUST Be Notified)		Date Results Needed								
Immediately Packed on Ice N <input checked="" type="checkbox"/> Y <input type="checkbox"/>	Same Day ..... 200% Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%		Email? No Yes FAX? No Yes			No. of Cntns <b>PK</b>					
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time		TCLP Metals + Nickel - no pres	Sulphate SPCON Ph	SV8270PAHSIM	Retain for later testing	
G20H21	Comp	SS	0-3"	10/25/2017	1245	4 3	X X				
G20	Comp	SS	0-3"	10/25/2017	1225	1				X Hold	
G21	Comp	SS	0-3"	10/25/2017	1230	1				X Hold	
H20	Comp	SS	0-3"	10/25/2017	1235	1				X Hold	
H21	Comp	SS	0-3"	10/25/2017	1240	1				X Hold	
I20J21	Comp	SS	0-3"	10/25/2017	1335	4 3	X X				
I20	Comp	SS	0-3"	10/25/2017	1315	1				X Hold	
I21	Comp	SS	0-3"	10/25/2017	1320	1				X Hold	
J20	Comp	SS	0-3"	10/25/2017	1328	1				X Hold	
J21	Comp	SS	0-3"	10/25/2017	1330	1				X Hold	
* Matrix: <b>SS</b> - Soil <b>GW</b> - Groundwater <b>WW</b> - WasteWater <b>DW</b> - Drinking Water <b>OT</b> - Other _____						pH _____	Temp _____				
Remarks: <b>soil samples</b>						Flow _____	Other _____	Hold #			
Relinquished by : (Signature) 		Date: <b>10/30/17</b>	Time: <b>14:15</b>	Received by: (Signature)			Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>	Condition: (lab use only)			
Relinquished by : (Signature) 		Date: _____	Time: _____	Received by: (Signature)			Temp: <b>24 m/sd</b> °C Bottles Received: <b>145+24</b>	DOC Seal Intact: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> NA			
Relinquished by : (Signature) 		Date: _____	Time: _____	Received for lab by: (Signature) <b>DBZ 834</b>			Date: <b>10/31/17</b> Time: <b>0845</b>	pH Checked: _____	NCF: _____		

Company Name/Address:  Absaroka Energy and Environmental Solutions LLC 112 High Street Buffalo, WY 82834		Billing Information:  accounts payable - Randolph Moses 112 High Street Buffalo, Wyoming 82834				Analysis / Container / Preservative				Chain of Custody Page 15 of 15			
Report to: Randolph J. Moses		Email To: randolph.moses@absarokasolutions.com								 <b>ESCI</b> LAB SCIENCES YOUR LAB OF CHOICE 12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859 L# L947N37 Table # Acctnum: ABSENEBWY Template: T129208 Prelogin: P623547 TSR: 728-Shane Gamb PB: Shipped Via: FedEx Standa Rem./Contaminant      Sample # (lab only)			
Project Listou 21-35-18B Description:		City/State Montana Collected:											
Phone: 855.684.5891 Fax:	Client Project # JBO.MT.0124.01		Lab Project # ABSENEBWY-Listou										
Collected by (print):	Site/Facility ID #		P.O. #										
Collected by (signature):  Immediately Packed on Ice N Y ✓	<b>Rush?</b> (Lab MUST Be Notified)  Same Day ..... 200% Next Day ..... 100% Two Day ..... 50% Three Day ..... 25%		Date Results Needed  Email? No Yes FAX? No Yes				SAR 4ozClr - No Pres  SV8270PAHSIM 4ozClr-NoPres  SVEPHMT 4ozAmb-NoPres  TCLP Metals+nickel 8 0zCLR-NoPres  TS 4ozCLR-NoPres  VPHMT 40mlAmb\MeOH15mm\Syr						
Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs PL							
Q14R15	Comp	SS	0-3in	10/26/17	1030	4 3	X						
Q14	Comp	SS	0-3in	10/26/17	1030	1							X Hold
Q15	Comp	SS	0-3in	10/26/17	1030	1							X Hold
R14	Comp	SS	0-3in	10/26/17	1030	1							X Hold
R15	Comp	SS	0-3in	10/26/17	1030	1					X Hold		
M16O18	Comp	SS	0-3in	10/26/17	0945	4 3	X				34 28		
M16	Comp	SS	0-3in	10/26/17	0945	1					X Hold		
M17	Comp	SS	0-3in	10/26/17	0945	1					X Hold		
M18	Comp	SS	0-3in	10/26/17	0945	1					X Hold		
O16	Comp	SS	0-3in	10/26/17	0945	1					X Hold		
* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other						pH _____ Temp _____				Hold #			
Remarks: If EPH Screen is over 200 mg/Kg, follow supplementary testing procedure.						Flow _____ Other _____							
Relinquished by: (Signature)		Date: 10/30/17	Time: 14:15	Received by: (Signature)		Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>							
Relinquished by: (Signature)		Date: 10/30/17	Time: 14:15	Received by: (Signature)		Temp: °C Bottles Received: 24 145+2 TB 145+2 TB		Condition: (lab use only)					
Relinquished by: (Signature)		Date: 10/30/17	Time: 14:15	Received for lab by: (Signature) DT D - 834		Date: 10-31-17	Time: 0845	pH Checked: <input checked="" type="checkbox"/> NA: <input type="checkbox"/>					

\* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

pH \_\_\_\_\_ Temp. \_\_\_\_\_

Remarks: soil samples

Flow \_\_\_\_\_ Other \_\_\_\_\_

Hold

Relinquished by : (Signature)

Condition: (lab use only)

Lettres

FedEx    Courier    \_\_\_\_\_

Relinquished by : (Signature)

Temp: °C Bottles Received

COC Seal Intact:  Y  N  NA

100

21 50 11.21

pH Checked: NCE: ✓



**ESC LAB SCIENCES**  
**Cooler Receipt Form**

Client:	ABSENCEBWY	SDG#	L94743
Cooler Received/Opened On:	10/3 /17	Temperature:	2.4°C
Received by :	David Riggan		
Signature:			
Receipt Check List	NP	Yes	No
COC Seal Present / Intact?	/	✓	/
COC Signed / Accurate?	/	/	✓
Bottles arrive intact?	/	/	✓
Correct bottles used?	/	✓	/
Sufficient volume sent?	✓	/	/
If Applicable	/	✓	/
VOA Zero headspace?	✓	/	/
Preservation Correct / Checked?	/	/	✓

**ESC Lab Sciences**  
**Non-Conformance Form**

Login #: L947437	Client: ABSENEBWY	Date: 10/31/17	Evaluated by: Jeremy
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**Non-Conformance (check applicable items)**

Sample Integrity	Chain of Custody Clarification	If Broken Container:
Parameter(s) past holding time	x Login Clarification Needed	
Improper temperature	Chain of custody is incomplete	Insufficient packing material around container
Improper container type	Please specify Metals requested.	Insufficient packing material inside cooler
Improper preservation	Please specify TCLP requested.	Improper handling by carrier (FedEx / UPS / Courier
Insufficient sample volume	Received additional samples not listed on coc.	Sample was frozen
Sample is biphasic.	Sample ids on containers do not match ids on coc.	Container lid not intact
Vials received with headspace.	Trip Blank not received.	
Broken container	Client did not "X" analysis.	
Broken container:	Chain of Custody is missing	Date/Time:
Sufficient sample remains		Temp./Cont. Rec./pH:
		Carrier:
		Tracking#

**Login Comments:**

1. Did not receive L18
2. Received the vial broken for K19L20
3. Received 1-4oz-Amb for B17 not on COC.
4. Received 2 sets of P9-P10 (one set with time of 1620 and the other 1625)
5. Did not receive P11-P12.
6. Received 2 sets of N21023 (One set time of 1320 and the other at 1325)

Client informed by:	Call	Email	Voice Mail	Date: 11/01/17	Time:
TSR Initials:CSG	Client Contact: Randolph Moses				

**Login Instructions:**

- 1) Sample L18 was found, please place on hold
- 2) Client notified, we will prep from 4oz jar for the VPH
- 3) Sample is actually L18
- 4) Please log both sets of P9-P10 with sample times of 1620 and 1625 as 2 separate samples for SVEPHSMT and VPHMT
- 5) Client notified
- 6) Please log both sets of N21023 with sample times of 1320 and 1325 as 2 separate samples for SVEPHSMT and VPHMT

---

**Andy Vann**

**From:** Shane Gambill  
**Sent:** Thursday, November 09, 2017 7:54 AM  
**To:** Andy Vann; Login  
**Subject:** L947437 \*ABSENCEBWY\* Add SVEPHMT

Andy/Login:

Please add SVEPHMT to the samples below and place into workgroups:

L947437-04 (WG1037727)  
L947437-21 (WG1037733)  
L947437-27 (WG1037733)  
L947437-31 (WG1037733)  
L947437-32 (WG1037733)

Thanks,

**\* Shane Gambill**

*Technical Service Representative*

ESC Lab Sciences-a subsidiary of Pace Analytical  
12065 Lebanon Road | Mt. Juliet, TN 37122  
615.773.9747 | Cell 615.881.4570  
sgambill@esclabsciences.com | [www.esclabsciences.com](http://www.esclabsciences.com)

## **Appendix H – Correspondence**

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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

June 23, 2017

Mr. John Brown  
J. Burns Brown Operating Company  
P.O. Box 420  
Havre, MT 59501

**Re: Notice of Violation: Crude oil spill from Listou 21-35-18B production site onto BLM land, north of Chinook, Blaine County, Montana. Enforcement CVID # 19728**

Dear Mr. Brown:

On March 30, 2017, the Montana Department of Environmental Quality (DEQ) Enforcement Division (ENFD) was informed of a release of crude oil and production water from an oil well production site that discharged into a “tailwater” or “toe” of the North Chinook Reservoir. The crude oil production well and associated production operation is operated by J. Burns Brown Operating Company (JBBOC).

DEQ-ENFD initially referred the Complaint/Spill CVID # 19728 to the Bureau of Land Management (BLM), Havre Field Office, because BLM owns the surface land on which the spill occurred. The Montana Board of Oil and Gas (MBOG) has authority over cleanup and other activities within the boundary of the oil production pad. Several agencies and programs, including the United States Environmental Protection Agency (EPA), the United States Fish and Wildlife Service (FWS), the Montana Department of Fish Wildlife and Parks (FWP), and DEQ’s Groundwater Remediation Program (DEQ-GRP) provided support and technical expertise to BLM. During a May 3, 2017 meeting and site inspection, BLM requested that DEQ serve as the lead regulatory agency for oversight of the portions of the release outside the well pad. Thus, DEQ-GRP is proceeding as the lead agency over the contaminated areas existing outside of the well pad, and will coordinate with the other agencies.

On May 2, 2017, DEQ-GRP received via email a remediation plan from your contractor, Arcadis, entitled “Remediation –Sampling–Restoration Plan” (the Plan). Thank you for providing the Plan. DEQ has provided comments on the Plan later in this document.

The legal location of the site is described as Township 21 North, Range 35 East, and Section 18. The spill is located on property owned by BLM. The areas impacted by the oil include a short-grass prairie upland, and a wetland that is part of the tail-waters of the North Chinook

Reservoir. According to information provided by BLM, the well pad is located approximately 110 feet from hydric wetland soils. There is a grazing allotment on the affected property. Information provided by BLM indicates that approximately 1 acre of the wetland had visible sheen and oil, while the Plan indicates that the total extent of hydrocarbon impact in the upland and wetland is 4.47 acres.

The exact amount of oil and produced water spilled at the site is not known. The Plan indicates that an estimated 238 barrels of crude oil and 1,200 barrels of produced water were reported to have spilled. The reason for the spill is also not known, but documents from DEQ-ENFD indicate that a “cracked valve” at the wellhead allowed the three onsite above-ground storage tanks to overflow. The overflow of crude oil and produced water from these tanks overflowed the secondary containment berm around the tanks, and then traveled into the tertiary containment area. The oil and water then eroded the tertiary containment berm and flowed north toward the wetland. Finally, the date that the release began is not known, because the production site had not been inspected for some time. At this time, the date of the last inspection of the production site is not known.

During the May 3, 2017 multi-agency site inspection, DEQ noted the presence of large areas of oiled soil and vegetation in the grassy upland area. Some areas appeared to hold several inches of free product crude oil, and one dead songbird and one dead duck were found. Free product crude oil was pooled in the containment areas of the well pad, and one dead songbird was found in the oil. Mr. David Rouse of FWS retrieved and bagged the two dead songbirds, but could not safely retrieve the dead duck. The inspection showed that the migration of the oil into the wetland may have been limited by dense cattails. During the inspection, the dewatered side of the wetland had no standing water in the areas of crude oil impacts.

Information in the Plan and from BLM indicates that, upon discovery of the release, JBBCOC arranged for the construction of an earthen dike across the toe of the wetland to contain the oil and produced water. Upon construction of the dike, water from the release-side of the wetland was pumped to the other side of the dike to dewater the impacted portion of the wetland. Based on DEQ’s May 3, 2017 site inspection, the dike was constructed well away from the oiled part of the wetland, and there is no evidence that oil was pumped from the contaminated toe of the wetland into the larger body of the wetland. In addition to the diking and dewatering, some oiled surface soils were scraped up with heavy equipment and stockpiled within the boundary of the well pad. On April 3 and 4, 2017, BLM notified JBBCOC to stop all cleanup activities pending the approval of a remediation plan. DEQ understands that JBBCOC began recovering free product crude oil from the well pad and upland on May 5, 2017, as directed via email correspondence from Mr. Gary Klotz of MBOG that authorized this work.

On May 8, 2017, DEQ sent an email approving the use of a vacuum truck to remove oil and contaminated fluids from the wetland, with certain provisions. On June 1, 2017, DEQ sent an email approving the use of hand tools to cut oily vegetation, with certain provisions. On June 22, 2017, DEQ sent an email approving the use of sawdust as a sorbent, with certain provisions.

The Montana legislature promulgated the Montana Water Quality Act (WQA), § 75-5-101, MCA, *et. seq.*, in part, “to prevent, abate, and control the pollution of state waters.” See, § 75-5-102 (1), MCA. State waters include surface water and groundwater. See, § 75-5-103 (34)(a), MCA. Thus, under the WQA, it is unlawful to cause pollution of any state waters, or to place or cause to be placed any wastes where they will cause pollution of any state waters. § 75-5-605(1)(a), MCA. The release of crude oil and produced water where it has impacted surface water constitutes a violation of Sections 75-5-303, MCA, Sections 75-5-605(1)(a) and (d), MCA. Montana water quality standards state that surface water must be free of a visible oil film. Therefore, the presence of crude oil in the waters of the North Chinook Reservoir exceeds standards and is a violation of the WQA. Because it is DEQ’s determination that JBBOC operations caused the crude oil contamination of surface water at the site, DEQ hereby issues to JBBOC this violation letter pursuant to § 75-5-617(1)(a), MCA.

DEQ GRP has the following requirements and comments regarding this site and the Plan:

1. The first priority at this site is the removal and/or stabilization of free product crude oil. DEQ understands that crude oil removal started on May 5, 2017 with a vacuum truck. Crude oil that cannot be vacuumed must be removed using other means. Oiled vegetation may be wiped with sorbents, or cut and properly disposed. Oily water may be vacuumed and containerized pending proper disposal. Sheens and/or oil on surface waters may be controlled and cleaned with sorbent pads and booms. The Plan addresses these cleanup mechanisms. In addition, in a June 22, 2017 email, DEQ approved the application of sawdust to free/wet crude oil as an interim action to absorb crude oil, prevent migration of the oil, and act as a barrier between the oil and wildlife.
2. Conditional on BLM’s approval, oiled soil in the upland soils (soil located above the high water mark of the wetland/tailwater and not considered hydric) may be excavated and properly disposed.
3. Conditional on BLM’s approval, oiled soils in the wetland (soils located below the high water mark of the wetland and considered hydric) may be excavated and properly disposed.
4. Please indicate how the contaminated soils and other material are being disposed of, and provide a copy of the landfill correspondence specifying its acceptance of the waste.
5. At all times during work, please ensure that vehicles are not further tracking contamination from oily (contaminated) locations into clean (uncontaminated) locations. Please also ensure that vehicles are not mixing crude oil into the soil profile through their disturbance of the surface areas.

6. Please collect a sample of the free-product crude oil for the following analyses: Carbon Scan (also known as “fingerprinting”), total sulfur, and total analysis of nickel and the eight RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Please conduct this work as soon as possible. The results of the crude oil analyses may prompt the need for additional confirmation sampling analyses (see #9, below).
7. Plan, Page 6, 3<sup>rd</sup> bullet: The plan indicates that vegetation (presumably oiled) will be cut, collected, and disposed of. Please provide additional detail regarding the means by which this task will be accomplished. Oiled vegetation may be cut using hand tools (clippers, weed wackers, etc.), gathered, and properly disposed, and such work may commence immediately. If JBBCO wishes to use larger mechanized equipment (mowers, four-wheelers, etc.) in the wetland, then those actions must be proposed in detail and provided to DEQ and BLM for approval.
8. Plan, Page 6, 3<sup>rd</sup> bullet: The plan states that in areas where crude oil has impacted the wetland soils, but the soils cannot be cleaned up with mechanical methods, a product called MicroBlaze will be used to stimulate microbial degradation of oil. JBBCO must receive approval from BLM prior to using MicroBlaze, or similar products, and notify DEQ upon receiving that approval from BLM.
9. Plan, Page 7, Section 4, Confirmation sampling: The Plan specifies that confirmation samples will be collected for every 50 x 50 feet if excavated area. However, DEQ generally requires at least one sample must be collected for each 25 x25 feet of surface area in the excavation, and additional samples may be necessary based upon professional judgment. At a minimum, soil samples must be analyzed for Massachusetts Method (Ma-Method) Volatile Petroleum Hydrocarbons (VPH) and for Ma-Method Extractable Petroleum Hydrocarbon (EPH) Screen. If the EPH screen results in a total extractable hydrocarbon (TEH) value greater than 200 milligrams per kilogram (mg/kg, dry weight), then the sample (or a subset of samples) must be further analyzed for EPH Fractions and for Polynuclear Aromatic Hydrocarbons (PAHs) via Method 8270. DEQ recommends that the EPH confirmation samples be 5-point composite samples. Volatile samples may be grab samples. Please be aware that samples for volatile compounds must not be composited in the field. Rather, if compositing is necessary, subsamples must be submitted to the laboratory for compositing under controlled conditions. Please also note that aliquots of samples that have been used for field screening must not be submitted to the laboratory for analyses due to the likelihood for loss of contaminants. The results of the crude oil analyses (see #6, above) may prompt the need for additional analyses including metals and sulfate.

10. Plan, Page 7, Section 4: DEQ concurs with collecting background soil samples. Please ensure that representative background samples are collected from the upland and wetland soils, because these soils may be chemically different. Please provide the proposed locations of the background samples in a figure for review and approval. Background soil samples must be analyzed for all the constituents that will be analyzed for the confirmation samples including, potentially, metals and sulfate.
11. Plan, general comment: Please ensure that adequate quality assurance samples are collected, including equipment rinsate blanks (one per day), duplicates (at a rate of 5%), and trip blanks (for volatiles).
12. Collect surface samples from water on both sides of the dike for the following parameters: 1) Ma-Method VPH; 2) Ma-Method EPH Screen. If the EPH screen results in a TEH value greater than 1,000 micrograms per liter (ug/L), then the sample must be further analyzed for EPH fractions and for polynuclear aromatic hydrocarbons (PAHs) via Method 8270; 3) the eight RCRA metals (arsenic, barium, cadmium, chromium, lead, selenium, silver) and nickel; 4) specific conductivity; and 5) common ions. Results of surface water samples must be compared to DEQ's Circular DEQ-7 Montana Numeric Water Quality Standards (DEQ-7 Standards) for surface water. If a petroleum constituent has no DEQ-7 Standard (as is the case for the EPH and VPH fractions), the result may be compared to DEQ's Tier 1 Risk-Based Screening Levels (RBSLs) for petroleum in groundwater in order to assess risks to human health. If a constituent has no DEQ-7 Standard and no RBSL, it may be screened against EPA Region 3 Biological Technical Assistance Group (BTAG) Benchmarks for Freshwater: <https://www.epa.gov/risk/biological-technical-assistance-group-btag-screening-values>. Additional screening levels (for example, background surface water values from the North Chinook Reservoir) may be appropriate, and those must be approved by DEQ prior to collection.
13. Plan, Page 8, Section 4.1, Action Levels: The action levels provided in the plan are incomplete. Petroleum hydrocarbon results in soil samples must be compared to DEQ's Tier 1 Risk-Based Screening Levels. Metals in soils must be compared to Montana background metals levels (<http://deq.mt.gov/Land/statesuperfund/background>), site-specific background metals concentrations, or otherwise as per DEQ's soil screening process: <http://deq.mt.gov/Portals/112/Land/StateSuperFund/Documents/SoilScreenFlowchart2016.pdf?ver=2016-05-19-153548-370>.
14. Plan, Page 8, Section 4.1, Action Levels: The action levels provided in the plan are for soils. Some confirmation samples may be collected from sediment. Confirmation sample results from sediment samples must be screening against EPA Region 3 BTAG Benchmarks for Freshwater Sediment:

<https://www.epa.gov/risk/biological-technical-assistance-group-btag-screening-values>.

15. Depending on the results of confirmation soil, sediment, and surface water sampling, DEQ may require additional cleanup and sampling.
16. If crude oil is found to have migrated through the soil into the vadose zone, DEQ will require the installation of an appropriate number of monitoring wells to determine the extent and magnitude of groundwater contamination. If monitoring of the well network shows that petroleum compounds in groundwater exceed Circular DEQ-7 Numeric Water Quality Standards or RBSLs, and the well network does not adequately define the plume, then DEQ will require the installation of additional monitoring wells to define the plume of contaminated groundwater. DEQ requires a work plan for monitoring well installation and sampling in the event that crude oil is found in the vadose zone. If groundwater sampling is necessary, groundwater samples for petroleum hydrocarbons must be analyzed as described, above, for surface water.
17. Plan, Pages 8-12, Sections 5-6: These sections of the Plan regard restoration and weed management. Please note that DEQ will defer to BLM regarding approval of this portion the Plan, and BLM will be sending their conditions of approval in separate correspondence. At a minimum, JBBCO must control dust, prevent runoff and erosion, and control noxious weeds at the site. As required by section 7-22-2152, MCA, JBBCO must notify the county weed board of the cleanup activity and submit a revegetation plan meeting the requirements of section 7-22-2152, MCA and any other specific requirements of the board at least fifteen (15) days prior to initiation of the cleanup and or reclamation work. JBBCO must submit a copy of BLM's and the weed board's revegetation approval letter to DEQ.
18. All analytical data must be validated in accordance with DEQ's Data Validation Guidelines:  
<http://deq.mt.gov/Portals/112/Land/StateSuperFund/Documents/DataValidationReport.pdf>. Please note that a separate data validation report must be prepared for each sample delivery group. Please ensure that any data qualifiers are carried over into results tables.
19. DEQ understands that the crude oil release area falls within a BLM grazing allotment, and Ms. Kirsten Boyle of BLM has indicated that the cattle will be turned out in the middle of July, 2017. Please work with BLM to exclude cattle from the spill area with fencing. Excluding cattle is necessary to prevent cattle from coming to contact with crude oil, to prevent cattle from interfering with cleanup activities, and to prevent cattle from trampling or otherwise interfering with the areas that will be seeded and revegetated. Please fence the impacted area and enough of the surrounding upland to enable reclamation/recovery equipment access and operation space. According to BLM, the fence will cross the wetland using the

north edge of the temporary dike, so there is enough space for equipment to cross the dike and still stay within the fenced area.

20. After any sampling or cleanup event, please submit a report to DEQ and BLM that contains the following, as appropriate, (this is not an exhaustive list):

- A brief description of the release
- A discussion of remedial work conducted at the site, including dates
- Tables, graphs, etc. of sampling results. Results tables must include applicable regulatory comparison criteria (standards, screening levels, etc.)
- All analytical results, laboratory data sheets, laboratory checklists, and chain-of-custody sheets
- Data validation reports
- A discussion of data quality: holding times and temperatures, sample preservation, any laboratory data quality issues, results of blanks and duplicates, etc.
- Copies of all waste manifests
- Copies of field logs and sampling forms
- A discussion of any deviations from any approved work plan
- A map or maps of the site. One map must show groundwater elevation contours (if appropriate) or an arrow indicating the groundwater flow direction. At least one map must show the locations of any potential receptors. Plume isoconcentration maps must be developed that show the contaminants of concern (COC), with isoconcentration lines for each of the following: the COC's required reporting value, the applicable standard or screening level, and the method detection limit. If soil samples have been collected, indicate the locations of these on a map. If an excavation has occurred, indicate the boundaries of the excavation on a map and also indicate the confirmation sample locations.
- Any recommendations for future remedial actions.

JBBC must send **written notification to DEQ within fourteen (14) days of receipt** of this certified letter stating BBC's commitment to conduct the actions and address the items outlined in items 1 through 20 (above). A revised version of the Plan that addresses DEQ's comments, and tentative schedule of implementation that addresses items 1 through 20 (above) must accompany the letter of commitment. DEQ understands that the implementation of the remediation plan is awaiting approval through BLM's pending National Environmental Policy Act (NEPA) analysis. Should the NEPA analysis require change to the above actions or the Plan, DEQ will notify BBC of those amendments. BBC will similarly provide written notification of its commitment to comply with amendments to the actions above and/or the Plan.

If BBC fails to comply with the requirements of this violation letter, DEQ is required by Section 75-5-617(2), MCA, to issue an administrative order or commence a civil action requiring compliance, which may include the assessment of penalties. In addition, a civil action may result in the assessment of DEQ's costs.

June 23, 2017

Page 8 of 8

Please contact me if you have any questions about this letter.

Sincerely,



Laura Alvey  
Groundwater Remediation Program  
Remediation Division  
Telephone: (406) 444-0212  
Email: [lalvey@mt.gov](mailto:lalvey@mt.gov)

cc:     Erica Mortensen, DEQ Legal  
         Dan Kenney, DEQ Enforcement  
         Micah Lee, BLM Havre Field Office  
         Kirsten Boyle, BLM Havre Field Office  
         Gary Klotz, MT Board of Oil and Gas  
         David Rouse, US FWS, Helena Office  
         Joyce Ackerman, US EPA Region 8, 1595 Wynkoop Street, Denver, CO 80202  
         Ron Andersen, Blaine County Environmental Health, PO Box 576, Chinook, MT 59523  
         Michael Inman, HUB International Mountain States Ltd, PO Box 549, Chinook, MT 59523  
         Christian Lehnert, Blaine County Weed Control Program, PO Box 1212, Chinook, MY 59523  
         Doug Martin, MT DOJ, Natural Resource Damages Program



September 28, 2017

Mr. John Brown and Ms. Sandy Brown  
J. Burns Brown Operating Company  
P.O. Box 420  
Havre, MT 59501

**Re: DEQ approval: September 2017 Revised Spill Cleanup Confirmation Soil Sampling work plan: Crude oil spill from Listou 21-35-18B production site onto BLM land, north of Chinook, Blaine County, Montana. Enforcement CVID # 19728**

Dear Mr. John Brown and Ms. Sandy Brown:

The Montana Department of Environmental Quality (DEQ) has reviewed the September 2017 work plan for soil confirmation sampling entitled Listou 21-35-18B Spill Cleanup Soil Sampling Plan (the Sampling Plan). Absaroka Energy and Environmental Solutions, LLC (AEES) prepared and submitted this Sampling Plan on your behalf. The Sampling Plan outlines a strategy for confirmation soil sampling, and incorporates the comments and requirements in DEQ's September 6, 2017 letter. DEQ approves the Sampling Plan.

Please note the following items regarding the Sampling Plan. These items do not require additional revisions to the Sampling Plan, but DEQ is providing them for the sake of clarity:

1. Page 1, 1<sup>st</sup> paragraph, last sentence: Please note that all of the affected lands are within property administered by the Bureau of Land Management (BLM). However, different portions of the Listou release and response fall under the authority of BLM, DEQ, the Montana Board of Oil and Gas, and other agencies.
2. Page 2, Table 3: Please note that the phone number for the BLM Havre office is incorrect in this table. The BLM Havre office telephone number is (406) 262-2820.
3. Page 3, Table 4: Please note that this is not a complete "incident chronology." Rather, it is a partial chronology of selected items related to the site.

On September 26, 2017, BLM and DEQ visited the site during a meeting with the North Chinook Irrigation Association. I talked with Mr. Lee Farmer about the status of the cleanup. We discussed that there are a few areas where some light soil staining is apparent. Mr. Farmer had marked these areas with orange pin flags. We discussed possibility of collecting soil

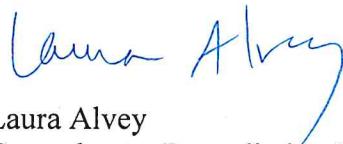
samples from a few of these stained areas for analysis of Extractable Petroleum Hydrocarbon (EPH) Screen to get some preliminary information regarding whether these lightly stained areas need to be excavated. I would be happy to assist with soil sample collection and subsequent data evaluation. Except for the areas of staining, the cleanup area appears to be ready for confirmation sampling. Please note that the confirmation sampling must occur as soon as possible, to allow a determination of whether cleanup is complete. Once DEQ determines that the site meets cleanup criteria, then reclamation/restoration (bringing in clean fill and topsoil, seeding, etc.) activities may commence. Ideally, the fill/soil placement and seeding work will be completed this fall.

During the September 26, 2017 site visit, a large quantity of contaminated soil remained at the site on the production site pending disposal. Thank you for placing a berm of clean soil between the contaminated soil pile and the remediated area. Confirmation soil sampling of the remediated area should occur as soon as possible, and is not dependent upon complete removal of the contaminated soil pile.

Please keep DEQ and BLM informed regarding planned sampling dates and times. Please provide, if possible, up to two weeks advance notice of sampling commencement. DEQ wishes to be present during all or part of soil confirmation sampling to oversee work and to collect split samples. DEQ will analyze split samples at no cost to you.

Please contact me if you have any questions about this letter.

Sincerely,



Laura Alvey  
Groundwater Remediation Program  
Remediation Division  
Telephone: (406) 444-0212  
Email: lalvey@mt.gov

cc: Jonathan Morgan, DEQ Legal  
Kirsten Boyle, BLM Havre Field Office  
Gary Klotz, MT Board of Oil and Gas  
David Rouse, US FWS, Helena Office  
Joyce Ackerman, US EPA Region 8, 1595 Wynkoop Street, Denver, CO 80202  
Ron Andersen, Blaine County Environmental Health, PO Box 576, Chinook, MT 59523  
Doug Martin, MT DOJ, Natural Resource Damages Program  
Randolph Moses, Absaroka Energy & Environmental Solutions, 112 High Street, Buffalo, WY 82834



January 2, 2018

Mr. John Brown and Ms. Sandy Brown  
J. Burns Brown Operating Company  
P.O. Box 420  
Havre, MT 59501

**Re: Updates and Requirements: Crude oil spill from Listou 21-35-18B production site onto BLM land, north of Chinook, Blaine County, Montana (the Site)**

Dear Mr. John Brown and Ms. Sandy Brown:

The Montana Department of Environmental Quality (DEQ) is providing this correspondence to document the current status of the Site and to provide requirements for additional work. This update includes: results of DEQ's October 25, 2017 site inspection and split sampling, and DEQ's preliminary review of the October 2017 confirmation soil sampling event.

On October 25, 2017, Ms. Kirsten Boyle of the Bureau of Land Management (BLM) and I visited the Site to inspect the site, collect split soil samples, and to collect a water sample from the North Chinook Irrigation system. The Site Inspection Report and laboratory data are attached.

- The analysis of the water sample (collected from the North Chinook Irrigation Canal where it crosses Norwegian Road) did not report detectable concentrations of petroleum hydrocarbons, and all detections were less than applicable standards and screening levels. Therefore, the results of the water sample indicate that the release of crude oil has not caused there to be detectable petroleum contamination in the North Chinook Irrigation system water. I have shared the water sample results with Mr. Mike Inman of the North Chinook Irrigation Association.
- The analysis of the two split soil samples reported some detections of petroleum hydrocarbons. DEQ's comparison of the two split soil samples to the results of the larger confirmation soil sample results show consistency in the petroleum analytes detected and in the petroleum compound that exceeded screening levels. Please refer to the table included in the attached Site Inspection Report.

DEQ reviewed the soil confirmation sampling results provided by your consultant, Absaroka Energy and Environmental Solutions, LLC (AEES) and the associated map. AEES provided

the data and map to DEQ in an email dated December 7, 2017. DEQ compared the results to applicable screening levels:

- DEQ's May 2017 Tier 1 Risk-Based Screening Levels (RBSLs) for subsurface soil (soil less than 2 feet) where groundwater is less than 10 feet deep (see RBSL Table 2)
- The Environmental Protection Agency's (EPA's) August 2006 BTAG Freshwater Sediment Screening Benchmarks. Note that these Benchmarks are not applicable to upland soils above the high-water mark. The Benchmarks were derived to protect aquatic invertebrates, and there should be no aquatic invertebrates in the upland soils.

DEQ's comparison of the confirmation soil sample results to screening levels indicates that one sample, G20H21, reported one petroleum analyte that exceeded an RBSL. Sample G20H21 had C11-C22 Aromatics at 1,520 milligrams per kilogram (mg/kg), which exceeds the applicable RBSL of 370 mg/kg.

On December 19, 2017, I spoke with Ms. Kirsten Boyle of the BLM. She indicated that she had visited the Site on December 15, 2017, and she provided me three photographs. These are some key pieces of information from my correspondence with Ms. Boyle:

- Much of the contaminated soil pile has been removed from the site, however, there is still some contaminated soil remaining. The contaminated stockpile is separated from the clean excavation by a berm.
- There appears to have been some additional digging (that occurred after confirmation soil sampling) near the riser that sits within the excavated area.
- There is still visually contaminated soil present around the riser (inside the small yellow fence).

Based on the information presented above, DEQ has the following comments and requirements:

1. Remove and properly dispose of the visually contaminated soil around the riser. This may be accomplished using hand tools. Please complete this task as soon as the soil at the Site is no longer frozen. This small amount of visually contaminated soil may be disposed along with the other excavated contaminated soil.
2. Except for Grid G20H21, the Site appears to meet screening levels. Grid G20H21 is located in the upland above the high-water mark. At this time, reclamation/restoration activities may commence in the wetland portion of the Site when weather allows.
3. Regarding Grid G20H21, DEQ's review indicates that this sample exceeded only one applicable screening level. Grid G20H21 had C11-C22 Aromatics at 1,520 mg/kg, which exceeds the applicable RBSL of 370 mg/kg. DEQ has requested AEES to review field notes, photographs, and field screening information and provide this review in their formal report of the soil confirmation sampling work, along with any recommendations. DEQ will make final determinations regarding whether additional cleanup is needed in the upland after reviewing the final AEES report of confirmation soil sampling.

Please contact me if you have any questions about this letter. Also, please continue to provide updates to DEQ and BLM via email.

Sincerely,



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Groundwater Remediation Program  
Remediation Division  
Telephone: (406) 444-0212  
Email: lalvey@mt.gov

cc: Jonathan Morgan, DEQ Legal *w/o attachs*  
Kirsten Boyle, BLM Havre Field Office  
Gary Klotz, MT Board of Oil and Gas  
David Rouse, US FWS, Helena Office  
Joyce Ackerman, US EPA Region 8, 1595 Wynkoop Street, Denver, CO 80202 *w/o attachs*  
Ron Andersen, Blaine County Environmental Health, PO Box 576, Chinook, MT 59523  
Doug Martin, MT DOJ, Natural Resource Damages Program  
Randolph Moses, Absaroka Energy & Environmental Solutions, 112 High Street, Buffalo, WY 82834

**MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY  
WASTE MANAGEMENT & REMEDIATION DIVISION  
SITE INSPECTION REPORT**

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**Site:** Listou Blaine Co, J Burns Brown Operating CO Crude Oil Release on BLM Land

**Location of Facility:** Northeast of Havre, Northwest of Chinook, on the southeast end of the North Chinook Reservoir

**Directions to Site:** **(From Helena)** Take I-15 north from Helena to Great Falls, turn onto Highway 87 North to Havre, and turn east/right onto Highway 2. The BLM Havre field office is located on the west side of Havre at 3990 Hwy 2 West. To get to the site from the BLM field office, drive east on Highway 2 to Chinook. Turn north onto Road 325 (Lodge Creek Road) and drive approximately 8 miles, then turn west onto Norwegian Road. Drive approximately 2 miles, and Norwegian Road makes a 90 degree turn to the north. Continue N on Norwegian road (about 1.4 miles) until it makes another 90 degree turn to the west. Here you should be able to see the above-ground storage tanks of the Listou production side. Follow the dirt road to the production site. Be sure to close gates.

**Date & Time of visit:** October 25, 2017, 8:00 am to 1:30 pm

**DEQ Personnel:** Laura Alvey  
Groundwater Remediation Program

**Other Personnel on Site:** Kirsten Boyle, BLM Havre Field office  
Absoroka Energy & Environmental Solutions Field Sampling Team (3 staff)

**Activity:** Meet with Mr. Mike Inman at the HUB office in Chinook, inspect site with BLM, oversee confirmation soil sampling, also collect water sample from North Chinook Reservoir irrigation system

**Samples Collected:**  Yes  No

**Weather Observations:** Cool, overcast, very windy

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**Purpose** Determine a location for DEQ to collect a sample of water from the North Chinook Reservoir irrigation system, oversee confirmation soil sampling, collect one or more split soil samples.

**Background** Approximately 238 barrels of crude oil and 1,200 barrels of produced water were released from an oil production tank battery. The oil/water eroded the secondary containment berm and flowed into a wetland on the edge of the North Chinook Reservoir. Approximately 1 acre of the wetland had oil/visible sheen. The Bureau of Land Management (BLM) is the surface owner of the impacted area. The responsible party, J. Burns Brown Operating Co (JBBO), built an unauthorized dike across part of the wetland (several hundred feet away from any visible signs of contamination) to contain the spill

and then pumped the water out of the wetland and into the reservoir. In response to these activities BLM ordered JBBO to stop response actions until BLM received and approved a remediation plan. BLM was the lead agency overseeing response at this site until May 4, 2017 when BLM requested that DEQ take over as the lead agency (with BLM concurrence of DEQ requirements/authorizations). On May 8, DEQ authorized JBBO to use a vacuum truck to remove contamination from the areas outside the production site. On June 1, 2017, DEQ authorized JBBO to cut and dispose of oiled vegetation. On June 22, 2017, DEQ authorized JBBO to spread sawdust at the site to soak up crude oil and act as a barrier between the oil and wildlife. On July 17, 2017, DEQ authorized JBBO to remove contaminated soil, vegetation, and other contaminated materials from the site. By October 2017, contaminated soil had been removed from the site and DEQ determined that the area was ready for confirmation soil sampling. The contaminated soil was stockpiled on the production site, and DEQ determined that its presence should not preclude the collection of confirmation soil samples.

General Comments / Observations (Odors, surrounding land use, visual contamination, etc)

Laura Alvey (LA) met Kirsten Boyle (KB) at 8:00 am at the BLM office in Havre. At 9:00 am, LA and KB arrived in Chinook at the office Mr. Mike Inman (MI, manager of the North Chinook Reservoir irrigation system). LA and KB met with MI to determine a location to collect a water sample from the North Chinook Reservoir. A decision was made to collect the water sample from the North Chinook Irrigation Canal where the canal crosses Norwegian Road (near the site).

At 10:00 am, LA and KB arrive at the site. The AEES team (3 people) was already onsite and working. The weather was cool, overcast, and very windy. The AEES team was using appropriate procedures for soil sampling. The team decontaminated equipment between each sampling location, and was using GPS and spray paint (the kind used for marking utilities) to mark and track sample locations. Subsamples were collected from each grid for compositing. Subsamples were field screened with a photoionization detector (PID).

LA collected split soil samples from locations F22 and H19, both of which displayed some residual staining and crude oil odor. Samples were labeled as such:

- Listou-H19-SS-102517 time: 12:35
- Lisout-F22-SS-102517 time: 12:45

KB and LA walked the site. The site was mostly dry, but there was an area toward the center of the excavated area where some water had pooled. The pooled water was from snow melt that had pooled where the excavation had gone deeper than the surrounding area. There was no sheen on the water surface, however, there was a small amount of some dark oily material that had accumulated at the downwind end of the ponded area. AEES collected a water sample from this location.

KB and LA inspected the production site. Near the edge of one of the ponds, there was a 5-gallon bucket and two glass jars full of what appeared to be crude oil. AEES stated they believed the oil in the glass jars was for product identification. Another concern was that oil was leaking out of a shed into a large puddle of water, indicating that some part of

the system had not been properly shut down.

At 12:50 KB left the site in her own vehicle. LA left the site and traveled to the location where the North Chinook irrigation canal (NCIC) crosses Norwegian Road. The water was turbid and had a yellowish-green color. There was no sheen or odor or other evidence of crude oil contamination on the water. Along the banks of the canal were hoof prints and cow manure. LA collects a set of water samples:

- Sample ID: Listou-NCIC-SW-102517 time: 13:30
- Coordinates for the sample: N 48.75607, W 109.32426
- Analyses to be run: volatile petroleum hydrocarbons, extractable petroleum hydrocarbon screen, domestic water suite
- LA placed all samples in an iced cooler, and hand-delivered the samples to Energy Laboratories in Helena on October 26, 2017.

#### Contaminant Summary

The ground surface that had been covered in crude oil has been largely scraped up to visually clean soil. In a few locations, crude oil soaked deeper into the soil (possibly with cracks or in animal burrows, and there was still some light staining and light odor. The samples DEQ analyzed, F22 and H19, were representative of stained areas, and should represent worst-case contamination concentrations.

DEQ validated the sample results, and found them to be of appropriate quality for the purposes of the investigation. A copy of the laboratory data and the data validation report are attached. Also attached is a table that summarizes the DEQ sample results compared to applicable screening levels and compared to the AEES results.

#### Conclusions

Some additional work may need to be conducted in the area that include grids G20 to H21. However, the rest of the site appears to meet applicable screening levels, and is therefore ready for clean soil and seeding (restoration/reclamation).

#### Photographic Log

See attached.

#### Site Map

See attached.

This field investigation and the associated report were completed as described above.

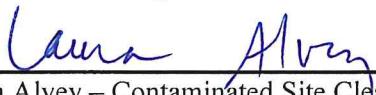
1-2-2018  
Laura Alvey – Contaminated Site Cleanup Bureau, DEQ Remediation      Date

TABLE: comparison of October 25, 2017 DEQ split sample results to screening levels and to sample collected by AEES

		DEQ split soil sample Listou-F22-SS-102517	DEQ split soil sample Listou-H19-SS-102517	AEES Composite G20H21	Method Reporting Limit for DEQ Samples	Risk-Based Screening Level	EPA BTAG Sediment Screening Benchmark	Units
Method	Analyte							
SW8270C	1-Methylnaphthalene	ND	0.21	0.253	0.0076	2.1		mg/kg
SW8270C	2-Methylnaphthalene	ND	0.029	0.219	0.0076	6.9		mg/kg
SW8270C	Acenaphthene	ND	ND	0.133	0.0076	27	0.0067	mg/kg
SW8270C	Acenaphthylene	ND	ND	0.0297	0.0076		0.0059	mg/kg
SW8270C	Anthracene	0.042	ND	0.107	0.0076	2600	0.0572	mg/kg
MA-VPH	Benzene	ND	ND	NA	0.058	0.07		mg/kg
SW8270C	Benzo(a)anthracene	0.024	ND	0.0166	0.0076	6.8	0.108	mg/kg
SW8270C	Benzo(a)pyrene	0.016	ND	0.0146	0.0076	2.3	0.15	mg/kg
SW8270C	Benzo(b)fluoranthene	ND	ND	0.0357	0.0076	23		mg/kg
SW8270C	Benzo(g,h,i)perylene	ND	ND	0.0212	0.0076		0.17	mg/kg
SW8270C	Benzo(k)fluoranthene	ND	ND	0.0109	0.0076	230	0.24	mg/kg
MA-EPH	C11 to C22 Aromatics	208 J+	379 J+	1520	11	370		mg/kg
MA-EPH	C19 to C36 Aliphatics	162 J+	266 J+	1210	11	200000		mg/kg
MA-VPH	C5 to C8 Aliphatics	ND	ND	2.5	2.3	220		mg/kg
MA-VPH	C9 to C10 Aromatics	5.8	12	9.02	2.3	130		mg/kg
MA-VPH	C9 to C12 Aliphatics	8.2	13	11.5	2.3	640		mg/kg
MA-EPH	C9 to C18 Aliphatics	57 J+	126 J+	591	11	900		mg/kg
SW8270C	Chrysene	0.021J-	ND	0.0789	0.0076	690	0.166	mg/kg
SW8270C	Dibenz(a,h)anthracene	ND	ND	0.00793	0.0076	7.5	0.033	mg/kg
MA-VPH	Ethylbenzene	ND	ND	NA	0.058	26	1.1	mg/kg
SW8270C	Fluoranthene	ND	ND	0.039	0.0076	85	0.423	mg/kg
SW8270C	Fluorene	0.019	0.087	0.176	0.0076	35	0.0774	mg/kg
SW8270C	Indeno[1,2,3-cd]pyrene	ND	ND	<0.06	0.0076	77	0.017	mg/kg
MA-VPH	m-p-Xylenes	ND	ND	NA	0.058	320	0.0252	mg/kg
MA-VPH	Methyl tert-butyl ether (MTBE)	ND	ND	NA	0.12	0.078		mg/kg
SW8270C	Naphthalene	0.01J+	0.25J+	0.0402	0.0076	12	0.176	mg/kg
MA-VPH	Naphthalene	0.18J+	0.019J+	NA	0.12	12	0.176	mg/kg
MA-VPH	o-Xylene	ND	ND	NA	0.058	320	0.0252	mg/kg
SW8270C	Phenanthrene	0.035	0.2	0.468	0.0076		0.204	mg/kg
SW8270C	Pyrene	0.023	0.051	0.116	0.0076	83	0.195	mg/kg
MA-VPH	Toluene	ND	ND	NA	0.058	21		mg/kg
MA-EPH	Total Extractable Hydrocarbons	469	843	2590	11	200*		mg/kg
SW82015M	Total Extractable Hydrocarbons	732	1210	NA	11	200*		mg/kg
MA-VPH	Total Purgeable Hydrocarbons	38	52	NA	2.3			mg/kg
MA-VPH	Xylenes, Total	ND	ND	NA	0.058	320	0.0252	mg/kg

Notes:

J+ = results are estimated and biased high based on data validation process

J - = results are estimated and biased low based on data validation process

\* the 200 mg/kg value in the RBSI column is not a screening level; instead, it is a concentration that triggers additional analysis

Results shaded grey exceed EPA's Freshwater Sediment Benchmark

Results shaded yellow exceed DEQ's Risk-Based Screening Level

# October 25, 2017 Listou Crude Oil Release Site Inspection

## All photos taken by Laura Alvey

View to the south. Photo is of the east end of the water pool. A small amount of what may be oil mixed with soil has blown to the very east end of the pool. A very light silvery sheen is present on the still wet soil surface.

View to the south. Photo is of an area of pooled water (snowmelt) in a deeper part of the excavation. There is no sheen on the water surface. AEES collected a water sample from this pool, and their footsteps can be seen in the photo.



October 25, 2017 Listou Crude Oil Release Site Inspection  
All photos taken by Laura Alvey

Photo was taken within production site. Photo is of bucket of crude oil and two jars of crude oil. The purpose of these jars of oil is unknown, but is presumed to be for product fingerprint analysis.

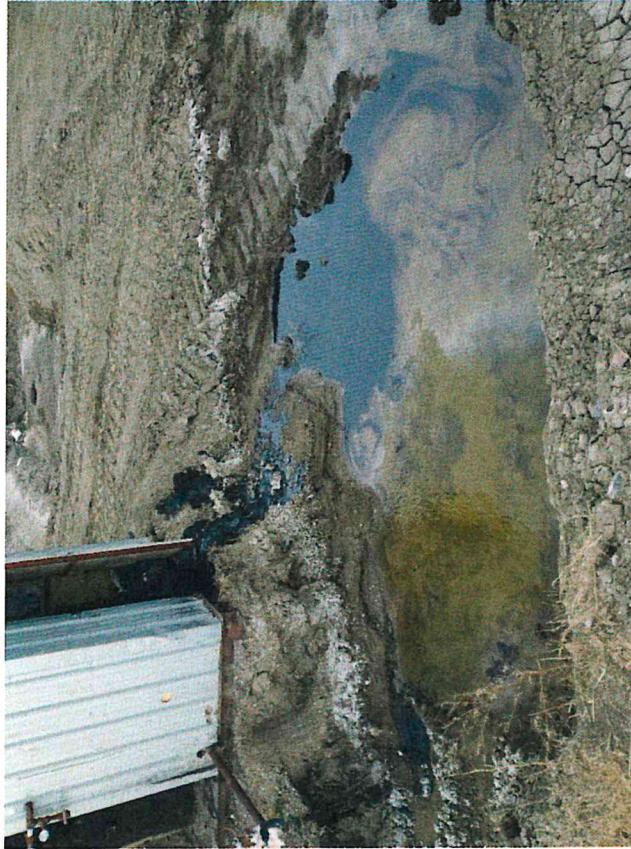
This photo is a closeup of the two oil-filled jars and the soil stain surrounding them.



October 25, 2017 Listou Crude Oil Release Site Inspection  
All photos taken by Laura Alvey

Photo was taken within production site. Photo was taken to document crude oil leaking out of a pump house into a large puddle of water. Note oil and sheen on water surface.

This photo is a closeup of the oil and sheen on the water surface that has leaked from the pump house.



# October 25, 2017 Listou Crude Oil Release Site Inspection

## All photos taken by Laura Alvey

Photo was taken within production site. Photo was taken to document crude oil leaking out of a pump house into a large puddle of water. Note oil-water separator tank in background.



This photo is what remains of the former pump jack and oil well head. At the time of the site visit, there was a hissing sound coming from this equipment, which suggests the well has not yet been properly shut in.



October 25, 2017 Listou Crude Oil Release Site Inspection  
All photos taken by Laura Alvey

Photo of oil-stained soil and vegetation on heavy equipment at the site. Note the potential for crude oil to be tracked and spread around the site.

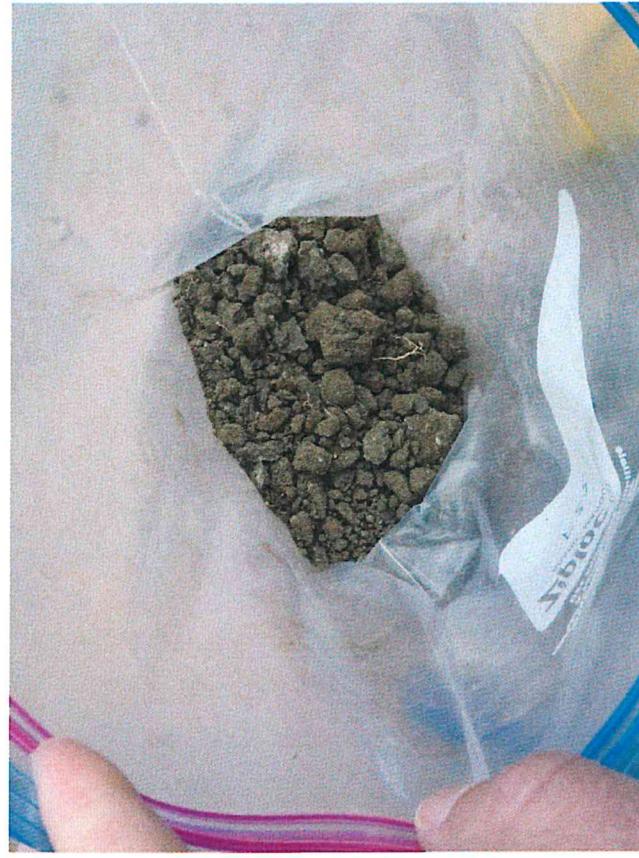
Photo taken looking northwest toward riser and sampling team. On the left side of the photo, note the pile of dirt that is the berm that separates the production site from the cleaned part of the site.



October 25, 2017 Listou Crude Oil Release Site Inspection  
All photos taken by Laura Alvey

Photo of soil samples F22 and H19. These samples had some light petroleum odor and sporadic staining. These are the samples from which DEQ collected split soil samples.

Photo taken of soil sample F22. The light staining present in the sample is not visible in this photograph.



# October 25, 2017 Listou Crude Oil Release Site Inspection

## All photos taken by Laura Alvey

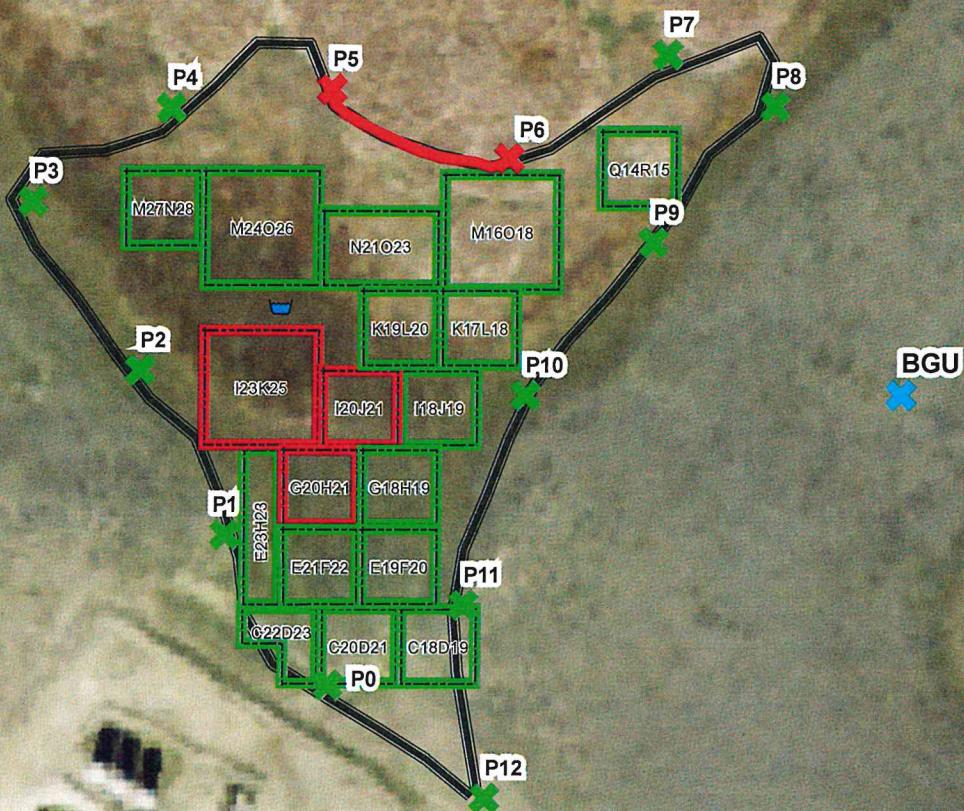
Photo looking northeast at the North Chinook Irrigation canal just upstream of where it crosses Norwegian Road. No sheen or other evidence of oil contamination. Water is turbid. Canal edge has cow manure and many hoof prints.

Photo taken looking east at the North Chinook Irrigation Canal where it goes under Norwegian Road. This is where DEQ collected the water sample Listou-NCIC-SW-10252017.



## Map showing location of October 25, 2015 surface water sample collected by DEQ from the North Chinook Irrigation Canal





### Map Key

- Water Sample Location (WS-M24)
- Background Sample Location
- Perimeter - Below Threshold
- Perimeter - Exceeds Threshold
- Soil Sample - Below Threshold
- Soil Sample - Exceeds Threshold
- Mapped Perimeter of Spill



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Date: 12/6/2017

JBO.MT.0124.01

### John Burns Brown Oil Company Listou 21-35-18B Confirmation Sampling Results

Blaine County, Montana

0 35 70 140 210  
Feet

Coord. Sys.: NAD 1983 UTM Zone 12N

John Burns Brown  
Oil Company

Scale: 1:1,445



**TABLE 1**  
**TIER 1 SURFACE SOIL (0-2 ft) RBSLs (mg/kg)**  
**(includes default RBSLs)**

This table applies to contaminated surface soil from 0-2 feet below ground surface. Distance to water is from the sample depth to the water table. For VPH compounds at UST sites, default RBSLs (**bold**) are used to determine if a release has occurred at a site. Default RBSLs apply to the entire soil column and always apply in the absence of adequate information. For EPH compounds, the 200 ppm EPH screen concentration is used to determine if additional analysis (fractionation) is needed.

Distance to groundwater	< 10 feet to groundwater				10-20 feet to groundwater				> 20 feet to groundwater				
	E	Residential RBSL (mg/kg)	B	Commercial RBSL (mg/kg)	B	Residential RBSL (mg/kg)	B	Commercial RBSL (mg/kg)	B	Residential RBSL (mg/kg)	B	Commercial RBSL (mg/kg)	B
<b>For Gasoline and Light Hydrocarbons measured using the Massachusetts Method for Volatile Petroleum Hydrocarbons (VPH)</b>													
C5-C8 Aliphatics	n	52	dc	220	l	52	dc	290	dc	52	dc	290	dc
C9-C12 Aliphatics	n	77	dc	360	dc	77	dc	360	dc	77	dc	360	dc
C9-C10 Aromatics	n	130	l/dc	130	l	130	dc	470	l	130	dc	720	l
MTBE	c	0.078*	l	0.078*	l	0.16	l	0.16	l	0.25	l	0.25	l
Benzene	c	0.07**	l	0.07**	l	0.21	l	0.21	l	0.33	l	0.33	l
Toluene	n	21	l	21	l	65	l	65	l	100	l	100	l
Ethylbenzene	c	6.4	dc	26	l	6.4	dc	28	dc	6.4	dc	28	dc
Xylenes	n	72	dc	310	dc	72	dc	310	dc	72	dc	310	dc
Naphthalene	c	4.3	dc	12	l	4.3	dc	19	dc	4.3	dc	19	dc
<b>Lead Scavengers</b>													
1,2-Dibromoethane (EDB)	c	0.000086	l	0.000086	l	0.00022	l	0.00022	l	0.00033	l	0.00033	l
1,2-Dichloroethane (DCA)	c	0.019	l	0.019	l	0.052	l	0.052	l	0.079	l	0.079	l
<b>For Diesel and Heavy Hydrocarbons measured using the Massachusetts Method for Extractable Petroleum Hydrocarbons (EPH)</b>													
EPH Screen, Fractionate		200		200		200		200		200		200	
C9-C18 Aliphatics	n	110	dc	540	dc	110	dc	540	dc	110	dc	540	dc
C19-C36 Aliphatics	n	24,000	dc	200,000	dc	24,000	dc	200,000	dc	24,000	dc	200,000	dc
C11-C22 Aromatics	n	370	l	370	l	490	dc	1,300	l	490	dc	2,000	l
Acenaphthene	n	27	l	27	l	91	l	91	l	140	l	140	l
Anthracene	n	2,200	dc	2,600	l	2,200	dc	8,800	l	2,200	dc	14,000	l
Benz(a)anthracene	c	1.3	dc	6.8	l	1.3	dc	23	l	1.3	dc	24	dc
Benz(a)pyrene	c	0.13	dc	2.3	l	0.13	dc	2.4	dc	0.13	dc	2.4	dc
Benz(b)fluoranthene	c	1.3	dc	23	l	1.3	dc	24	dc	1.3	dc	24	dc
Benz(k)fluoranthene	c	13	dc	230	l	13	dc	240	dc	13	dc	240	dc
Chrysene	c	130	dc	690	l	130	dc	2,300	l	130	dc	2,400	dc
Dibenzo(a,h)anthracene	c	0.13	dc	2.4	dc	0.13	dc	2.4	dc	0.13	dc	2.4	dc
Fluoranthene	n	85	l	85	l	280	l	280	l	300	dc	440	l
Fluorene	n	35	l	35	l	120	l	120	l	180	l	180	l
Indeno(1,2,3-cd)pyrene	c	1.3	dc	24	dc	1.3	dc	24	dc	1.3	dc	24	dc
Naphthalene	c	4.3	dc	12	l	4.3	dc	19	dc	4.3	dc	19	dc
Pyrene	n	83	l	83	l	220	dc	280	l	220	dc	430	l
1-Methylnaphthalene	c	2.1	l	2.1	l	7.1	l	7.1	l	11	l	11	l
2-Methylnaphthalene	n	6.9	l	6.9	l	23	l	23	l	30	dc	35	l

## Notes:

E = Effect is either:

n = non-carcinogenic and direct contact RBSLs are based on a hazard quotient of 0.125 for a total hazard index which does not exceed 1, or

c = carcinogenic and direct contact RBSLs are based on a cancer risk of  $1 \times 10^{-6}$  for a total cancer risk which does not exceed  $1 \times 10^{-5}$ .

RBSLs for residential and commercial exposure to naphthalene are based upon carcinogenic inhalation risk.

B = Basis is the most conservative of:

l = leaching from soil to groundwater;

dc = residential direct contact including ingestion, inhalation, and dermal; or

bu = adversely affects beneficial uses (foul odor or taste).

If the leaching pathway is not the most conservative basis, residential or commercial RBSLs apply to surface soil.

\* = The best achievable practical quantitation limit (0.20) is greater than the RBSL; therefore, if the compound is detected, additional evaluation may be necessary.

\*\* = The best achievable practical quantitation limit (0.05) is greater than the RBSL; therefore, if the compound is detected, additional evaluation may be necessary.

\*\*\* = The best achievable practical quantitation limit (0.33) is greater than the RBSL; therefore, if the compound is detected, additional evaluation may be necessary.

For information regarding odor considerations, please refer to the Odors as a Significant Risk to Public Welfare/Nuisance Condition Section of the Montana Tier 1 Risk-Based Corrective Action Guidance for Petroleum Releases.

The RBSLs for soil and water are not designed to be protective of the vapor intrusion (VI) pathway. Please refer to the Vapor Intrusion Indoor Air Section of the Montana Tier 1 Risk-Based Corrective Action Guidance for Petroleum Releases.

**TABLE 2**  
**TIER 1 SUBSURFACE SOIL (>2 ft) RBSLs (mg/kg)**

This table applies to contaminated subsurface soil (>2 feet below the ground surface). Distance to water is from the sample depth to the water table. For VPH compounds at UST sites, default RBSLs, provided in bold on Table 1, are used to determine if a release has occurred at a site. Default RBSLs apply to the entire soil column and always apply in the absence of adequate information. For EPH compounds the 200 ppm screen concentration is used to determine if additional analysis (fractionation) of the soil sample is needed.

Distance to groundwater		< 10 feet to ground water		10-20 feet to ground water		> 20 feet to ground water	
Chemical units (mg/kg = ppm)	E	>2 ft Construction RBSL (mg/kg)	B	>2 ft Construction RBSL (mg/kg)	B	>2 ft Construction RBSL (mg/kg)	B
<b>For Gasoline and Light Hydrocarbons measured using the Massachusetts Method for Volatile Petroleum Hydrocarbons (VPH)</b>							
C5-C8 Aliphatics	n	220	l	410	dc	410	dc
C9-C12 Aliphatics	n	640	dc	640	dc	640	dc
C9-C10 Aromatics	n	130	l	470	l	720	l
MTBE	c	0.078*	l	0.16	l	0.25	l
Benzene	c	0.07**	l	0.21	l	0.33	l
Toluene	n	21	l	65	l	100	l
Ethylbenzene	c	26	l	84	l	130	l
Xylenes	n	320	l	610	dc	610	dc
Naphthalene	n	12	l	40	l	62	l
<b>Lead Scavengers</b>							
1,2-Dibromoethane (EDB)	c	0.000086	l	0.00022	l	0.00033	l
1,2-Dichloroethane (DCA)	c	0.019	l	0.052	l	0.079	l
<b>For Diesel and Heavy Hydrocarbons measured using the Massachusetts Method for Extractable Petroleum Hydrocarbons (EPH)</b>							
EPH Screen, Fractionate		200		200		200	
C9-C18 Aliphatics	n	900	dc	900	dc	900	dc
C19-C36 Aliphatics	n	200,000	dc	200,000	dc	200,000	dc
C11-C22 Aromatics	n	370	l	1,300	l	2,000	l
Acenaphthene	n	27	l	91	l	140	l
Anthracene	n	2,600	l	8,800	l	14,000	l
Benz(a)anthracene	c	6.8	l	23	l	35	l
Benzo(a)pyrene	c	2.3	l	7.5	l	12	l
Benzo(b)fluoranthene	c	23	l	76	l	120	l
Benzo(k)fluoranthene	c	230	l	750	l	1,200	l
Chrysene	c	690	l	2,300	l	3,500	l
Dibenzo(a,h)anthracene	c	7.5	l	24	l	38	l
Fluoranthene	n	85	l	280	l	440	l
Fluorene	n	35	l	120	l	180	l
Indeno(1,2,3-cd)pyrene	c	77	l	250	l	380	l
Naphthalene	n	12	l	40	l	62	l
Pyrene	n	83	l	280	l	430	l
1-Methylnaphthalene	c	2.1	l	7.1	l	11	l
2-Methylnaphthalene	n	6.9	l	23	l	35	l

Notes:

E = Effect is either:

n = non-carcinogenic and direct contact RBSLs are based on a hazard quotient of 0.125 for a total hazard index which does not exceed 1, or

c = carcinogenic and direct contact RBSLs are based on a cancer risk of  $1 \times 10^{-6}$  for a total cancer risk which does not exceed  $1 \times 10^{-5}$ .

RBSLs for construction work are based upon noncarcinogenic risk, including ingestion, dermal, and inhalation.

B = Basis is the most conservative of:

l = leaching from soil to groundwater;

dc = residential direct contact including ingestion, inhalation, and dermal; or

bu = adversely affects beneficial uses (foul odor or taste).

If the leaching pathway is not the most conservative basis, excavation RBSLs apply to subsurface soil.

\* = The best achievable practical quantitation limit (0.20) is greater than the RBSL; therefore, if the compound is detected, additional evaluation may be necessary.

\*\* = The best achievable practical quantitation limit (0.05) is greater than the RBSL; therefore, if the compound is detected, additional evaluation may be necessary.

For information regarding odor considerations, please refer to the Odors as a Significant Risk to Public Welfare/Nuisance Condition Section of the Montana Tier 1 Risk-Based Corrective Action Guidance for Petroleum Releases.

The RBSLs for soil and water are not designed to be protective of the vapor intrusion (VI) pathway. Please refer to the Vapor Intrusion to Indoor Air Section of the Montana Tier 1 Risk-Based Corrective Action Guidance for Petroleum Releases.

**TABLE 3**  
**TIER 1 GROUNDWATER RBSLs AND STANDARDS**

This table applies to groundwater and consists of DEQ-7 Human Health Standards (HHSs; DEQ 2012), where available. For compounds without DEQ-7 HHSs, DEQ has developed RBSLs and included them in the table. For EPH compounds, a total extractable hydrocarbon (TEH) concentration of 1,000 µg/L is used to determine if additional analysis (fractionation) is needed. Surface water impacts require a minimum of a Tier 2 evaluation.

Chemical	Effect	Basis	Groundwater Standard or RBSL (µg/l)
<b>For Gasoline and Light Hydrocarbons measured using the Massachusetts Method for Volatile Petroleum Hydrocarbons (VPH)</b>			
C5-C8 Aliphatics <sup>(b)</sup>	n	rb	650
C9-C12 Aliphatics <sup>(b)</sup>	n	rb	1,400
C9-C10 Aromatics <sup>(b)</sup>	n	rb	1,100
MTBE	n	hhs	30
Benzene	c	hhs	5
Toluene	n	hhs	1,000
Ethylbenzene	n	hhs	700
Xylenes	n	hhs	10,000
Naphthalene	c	hhs	100
<b>Lead Scavengers</b>			
Ethylene dibromide (EDB)	c	hhs	0.017
1,2-Dichloroethane (DCA)	c	hhs	4
<b>For Diesel and Heavy Hydrocarbons measured using the Massachusetts Method for Extractable Petroleum Hydrocarbons (EPH)</b>			
EPH / TEH Screen fractionation required <sup>(a)</sup>			1,000
C9-C18 Aliphatics <sup>(b)</sup>	n	rb	1,400
C19-C36 Aliphatics	n	bu	1,000
C11-C22 Aromatics <sup>(b)</sup>	n	rb	1,100
Acenaphthene	n	hhs	70
Anthracene	n	hhs	2,100
Benz(a)anthracene	c	hhs	0.5
Benzo(a)pyrene	c	hhs	0.05*
Benzo(b)fluoranthene	c	hhs	0.5
Benzo(k)fluoranthene	c	hhs	5
Chrysene	c	hhs	50
Dibenzo(a,h)anthracene	c	hhs	0.05*
Fluoranthene	n	hhs	20
Fluorene	n	hhs	50
Indeno(1,2,3-cd)pyrene	c	hhs	0.5
Naphthalene	c	hhs	100
Pyrene	n	hhs	20
1-Methylnaphthalene	c	rsl	11
2-Methylnaphthalene	n	rsl	36

## Notes:

(a) = An exceedance of the 1,000 µg/l EPH/TEH screen value indicates only that fractionation is required.  
If none of the fractions exceed, then the EPH/TEH value does not need to be identified as a COPC exceeding RBSLs.

(b) = The fraction surrogate (for modeling purposes) uses a representative compound with a mid range Equivalent Carbon Number (Massachusetts DEP 2002 Table 4-14). This number doesn't take into account the higher molecular weight compounds that have higher solubilities than the fraction surrogate therefore underestimating the overall solubility of the fraction.

## Effect is either:

n = non-carcinogenic RBSLs and RSLs are based on a hazard quotient of 1, or

c = carcinogenic RBSLs and RSLs are based on a cancer risk  $1 \times 10^{-5}$ .

## Basis is:

rb = risk-based screening level;

hhs = DEQ-7 Human Health Standard (DEQ, October 2012. Circular DEQ-7 Montana Numeric Water Quality Standards); or

rsl = tapwater risk-based screening level based upon TR of 1E-05 and THQ of 1.0 consistent with DEQ-7

bu = adversely affects beneficial uses (foul taste or odor).

\* = The best achievable practical quantitation limit (0.1 µg/L) may be greater than the human health standard; therefore, if the compound is detected, additional evaluation may be necessary.

The RBSLs for soil and water are not designed to be protective of the vapor intrusion (VI) pathway. Please refer to the Vapor Intrusion to Indoor Air Section of the Montana Risk-Based Corrective Action Guidance for Petroleum Releases.

TABLE 4 - MASTER TABLE

## ALL POTENTIAL TIER 1 RBSLs FOR SOIL (mg/kg)

Leaching RBSLs are based on the distance from the bottom of the contamination to the groundwater.

Chemical	Leaching 0-10 feet	Leaching 10-20 feet	Leaching >20 feet	Direct Contact Residential	Direct Contact Commercial*	Direct Contact Construction
<b>For Gasoline and Light Hydrocarbons measured using the Montana Method for Volatile Petroleum Hydrocarbons (VPH)</b>						
C5-C8 Aliphatics	220	770	1,200	52	290	410
C9-C12 Aliphatics	11,000	40,000	60,000	77	360	640
C9-C10 Aromatics	130	470	720	130	1,000	1,000
MTBE	0.078	0.16	0.25	52	230	8,900
Benzene	0.07	0.21	0.33	1.3	5.7	240
Toluene	21	65	100	610	5,500	5,500
Ethylbenzene	26	84	130	6.4	28	1,300
Xylenes	320	1,000	1,600	72	310	610
Naphthalene	12	40	62	4.3 <sup>c</sup>	19 <sup>c</sup>	140 <sup>a</sup>
<b>Lead Scavengers</b>						
1,2-Dibromoethane (EDB)	0.000086	0.00022	0.00033	0.04	0.18	7.8
1,2-Dichloroethane (DCA)	0.019	0.052	0.079	0.52	2.3	110
<b>For Diesel and Heavy Hydrocarbons measured using the Montana Method for Extractable Petroleum Hydrocarbons (EPH)</b>						
C9-C18 Aliphatics	53,000	170,000	270,000	110	540	900
C19-C36 Aliphatics	Considered Immobile		24,000	200,000	200,000	200,000
C11-C22 Aromatics	370	1,300	2,000	490	3,900	3,900
Acenaphthene	27	91	140	450	3,800	3,800
Anthracene	2,600	8,800	14,000	2,200	19,000	19,000
Benz(a)anthracene	6.8	23	35	1.3	24	390
Benzo(a)pyrene	2.3	7.5	12	0.13	2.4	39
Benzo(b)fluoranthene	23	76	120	1.3	24	390
Benzo(k)fluoranthene	230	750	1,200	13	240	3,900
Chrysene	690	2,300	3,500	130	2400	39,000
Dibenz(a,h)anthracene	7.5	24	38	0.13	2.4	39
Fluoranthene	85	280	440	300	2,500	2,500
Fluorene	35	120	180	300	2,500	2,500
Indeno(1,2,3-cd)pyrene	77	250	380	1.3	24	390
Naphthalene	12	40	62	4.3 <sup>c</sup>	19 <sup>c</sup>	140 <sup>a</sup>
Pyrene	83	280	430	220	1,900	1,900
1-Methylnaphthalene	2.1	7.1	11	20	81	1,400
2-Methylnaphthalene	6.9	23	35	30	250	250

c = based upon carcinogenicity

n = based upon non-carcinogenicity

\* = Construction workers are exposed to both surface and subsurface soil. The lower of construction or commercial RBSLs are provided here.

CONFIRMATION SAMPLING REPORT

